THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LIV. No. 1367.] LONDON, JULY 23, 1889. [41ST YEAR. Price 6d.

WOLSTON'S Paste and Ready Mixed for Use.

Warranted Free from Adulteration. **TORBAY PAINTS.**

FOR GASHOLDERS, &c., &c.

The Original "Torbay Paints"

As supplied during many years to the LONDON GASLIGHT & COKE COMPANY.

TORBAY & DART PAINT Co., Ld.,
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DARTMOUTH, & BRIXHAM (TORBAY).

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THE ONLY MAKERS OF
PATENT ANTIMONY PAINT,
Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores for Gas and Water Works.

WORKS:
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Ashmore, Benson, Pease, & Co., Ld.,
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Manufacturing Gas Engineers.
See Advertisement, p. 185.

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EARLE'S
BEST
PORTLAND CEMENT
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Seven Jetties on the River.
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Four Rully Entrances.
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Pure Water Supplies
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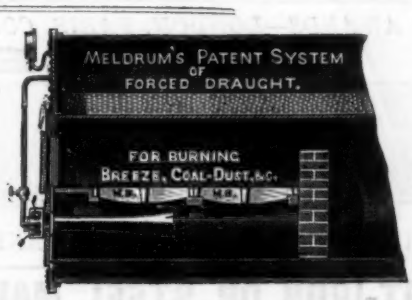
26, Half Street, Cathedral Yard, Manchester.



By the above system BREEZE or other Small and Poor FUEL may be BURNED WITH ADVANTAGE.

The bars are placed close together to obviate loss of Fuel. The action of the steam keeps them cool, and prevents clinker adhering. The Boiler may be forced as desired, and is independent of the chimney draught.

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MANUFACTURER OF

TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST IRON TANKS FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, AND ALL KINDS OF GAS APPARATUS,

WROUGHT-IRON ROOFS, BRIDGES, GIRDERS, ETC.,

STEAM, HOT WATER, AND RANGE BOILERS, TANKS, CISTERNS, BOATS,

AND ALL KINDS OF WROUGHT-IRON WORK.

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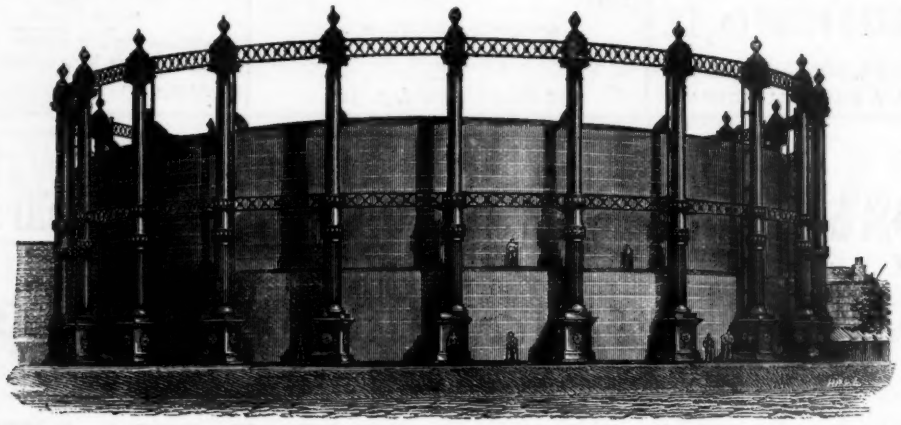
EDWARD COCKEY & SONS, Ld.,

ESTABLISHED OVER HALF A CENTURY.

Gas Engineers, Ironfounders, & Contractors,

Manufacturers of GASHOLDERS and TANKS, BOILERS and ENGINES, ROOFS, EXHAUSTERS, BREEZE SCREENS, CHARGING and COKE BARROWS, PATENT WASHERS, PATENT VALVES for PURIFIERS, &c., GOVERNORS, LAMP COLUMNS, WEIGHBRIDGES, COKE-BREAKERS.



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Estimates for any description of Gas Plant on application.

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MANUFACTURERS OF TUBES AND FITTINGS OF EVERY DESCRIPTION.

WROUGHT-IRON OR STEEL MAINS UP TO 6 FEET DIAMETER, FOR GAS, WATER, OIL, OR OTHER PURPOSES.

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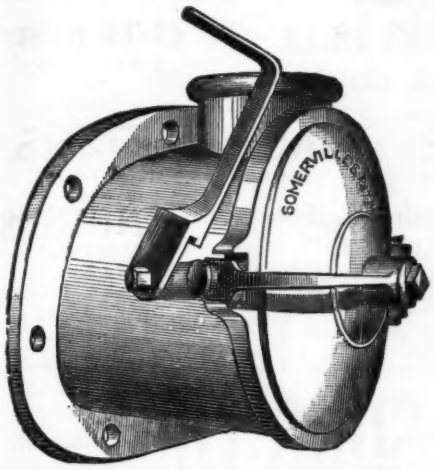

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INCLUDING

RETORTS AND FITTINGS, PURIFIERS, VALVES, PIPING SCRUBBERS, CONDENSERS, WASHERS, &c., &c., &c.;

GASHOLDER TANKS IN CAST AND WROUGHT IRON;

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ALL OF THE MOST APPROVED DESIGNS.

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MAKERS OF

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WHICH ARE SELF-SEALING AND REQUIRE NO LUTING.

Prices and further Particulars may be obtained on application.

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MANUFACTURERS OF EVERY DESCRIPTION OF

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FOR ANY PURPOSE.

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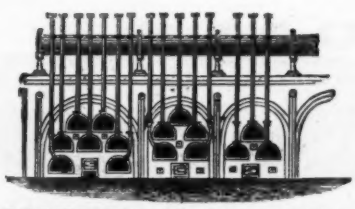
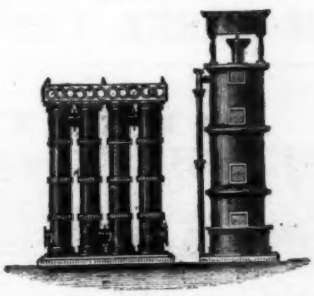
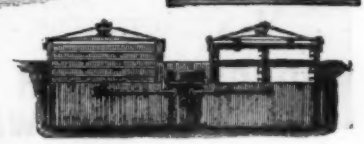
PATENT **CENTRE VALVES** for working Purifiers. Also Bye-Pass & Stop Valves.







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HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS and SPECIALS

WOOD GRIDS.

CAST AND WROUGHT IRON TANKS AND CISTERNS.

DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

CROSSLEY'S "OTTO" GAS-ENGINE.

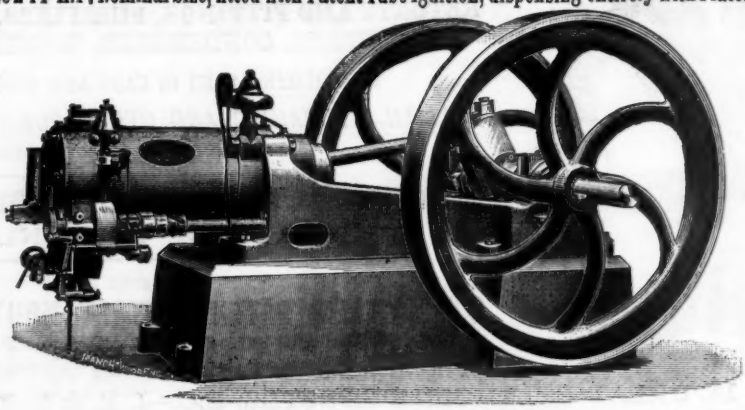
100 Prize Medals.

MADE in SIZES
2-Man to 100-HP.

GAS-ENGINES
COMBINED
WITH
PUMPS
FOR
TOWNS SUPPLY,
SEWAGE, &c., &c.

GAS-ENGINES
COMBINED
WITH
AIR COMPRESSORS
FOR THE
SHONE SEWAGE
SYSTEM, LUCIGEN
LIGHT, &c.

New 14-H.P. Nominal Size, fitted with Patent Tube Ignition, dispensing entirely with Plates.



MADE in SIZES
2-Man to 100-HP.

VERTICAL
AND
HORIZONTAL
TYPES.

ENGINES
COMBINED
WITH
HOISTS, PUMPS,
DYNAMOS, &c., &c.

Largely used for
EXHAUSTING,
PUMPING,
COKE CRUSHING,
ELECTRIC LIGHTING,
&c., &c.

Over 31,000 "OTTO" ENGINES are at work.

CROSSLEY BROS., LTD., OPENSHAW, MANCHESTER,

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LIVERPOOL,
GLASGOW,
NEWCASTLE,
BIRMINGHAM
HULL.

HARRIS & PEARSON,

STOURBRIDGE, ENGLAND.

MANUFACTURERS OF

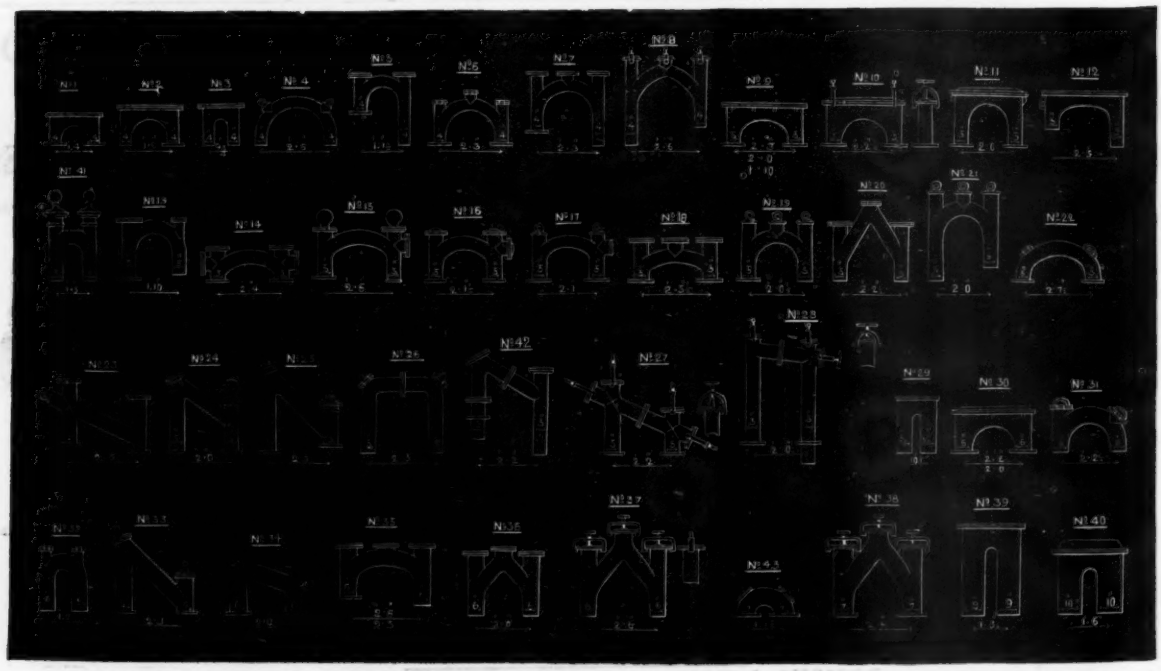
FIRE-CLAY GAS-RETORTS, FIRE-BRICKS, LUMPS, & TILES of Every Description.

GLAZED BRICKS AND PORCELAIN BATHS.

R. & J. DEMPSTER,

Engineers, Ironfounders, and Contractors,

GAS PLANT WORKS, NEWTON HEATH, MANCHESTER.



ARCH, BRIDGE, OR H PIPES.

Any of the above patterns can be made with either flange or spigot ends, and with faced flanges or turned and bored plugs if required.

Designs Nos. 26, 27, 28, and 42 can be altered to any desired span without extra charge. Other variations by arrangement.

Patterns for special designs or spans made to order.

KIRKHAM, HULETT, & CHANDLER, Ld.,

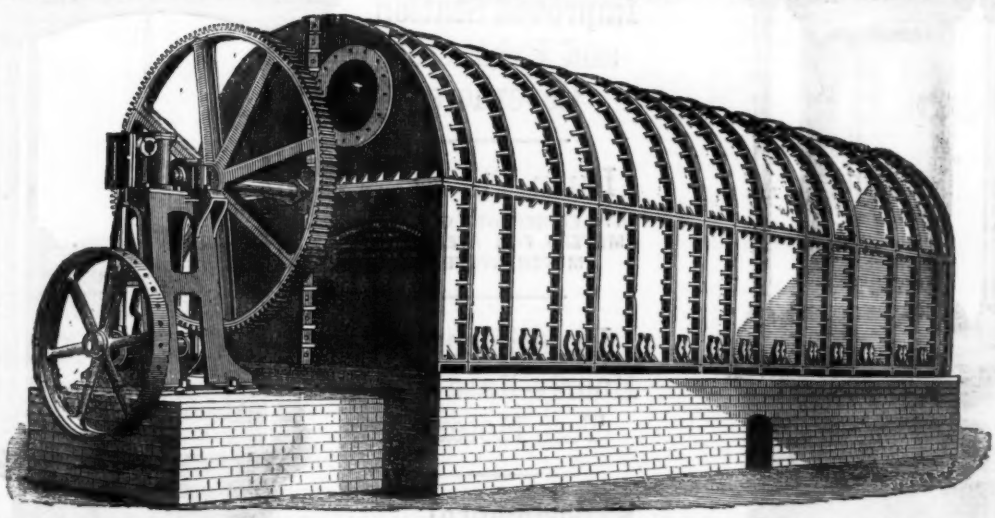
PALACE CHAMBERS,

9, BRIDGE ST., WESTMINSTER.

Mr. S. HERSEY, Managing-Director.

THE "NEW" PATENT

"Standard" Washer-Scrubber.



This engraving represents one of the four "Standards," for 3,000,000 feet each, erected for the Corporation of Leeds, and now in use at the New Wortley Station.

A Machine of same pattern, but for 2,000,000 feet, has also been put in operation at their York Street Station.

Thoroughly extracts every grain of Ammonia and a large quantity of other Impurities from Gas.

Has been for many months in successful and satisfactory operation at **The Gaslight and Coke Company's Station at BECKTON,**

Resulting in a second order just received to fit up a Washer-Scrubber, of 2½ millions capacity, upon this new principle, at the same station. Other orders for these machines are in course of execution.

A very large amount of patronage has been accorded the "Standard" Washer-Scrubber, of which, up till now, **367** have been supplied, representing a daily make of **318,260,000** cubic feet of gas; but the advantages of the **"New Standard"** will be readily recognized, and its superiority over the present "Standard" may be briefly summarized as follows:—

1. The weight in motion is **only one-seventh** of that in the present machine.
2. It requires **only one-seventh** the power to drive; consequently effecting a large reduction in cost of Engine as well as in steam power.
3. **The Wear and Tear is enormously reduced,** as the Shaft has comparatively little weight to carry.
4. It has been found that the washing surfaces **keep perfectly clean** and free from deposit from end to end of the Machine.
5. It is so constructed that it forms a most powerful, effective, and complete system of purification, gives no pressure, and can be removed and replaced without trouble or injury.
6. The "New Standard," owing to the foregoing, can be supplied at **a large reduction in price.**

Engineers desirous of working Ammoniacal Liquor over and over again prior to leaving the "New Standard" can do so by the automatic and simple arrangement which forms part of this Patent.

The Apparatus can be applied to "Standard" Washer-Scrubbers already in use.

Particulars will be furnished upon application to the above address.

R. LAIDLAW & SON.

IMPROVED WET AND DRY GAS-METERS

IN CAST-IRON AND TIN CASES.

Two Gold Medals, One Silver Medal, One Bronze Medal, and Two Honourable Mentions,

INTERNATIONAL EXHIBITION, EDINBURGH, 1886.

PRESSURE REGISTERS.

A LARGE STOCK OF GAS AND WATER METERS ALWAYS READY FOR IMMEDIATE DELIVERY OR SHIPMENT.

STATION METERS,

WITH ROUND OR SQUARE CASES.

Improved Station and Exhauster Governors.

Lamp Pillars,

WITH EITHER WET OR DRY METERS FOR AVERAGE METER SYSTEM.

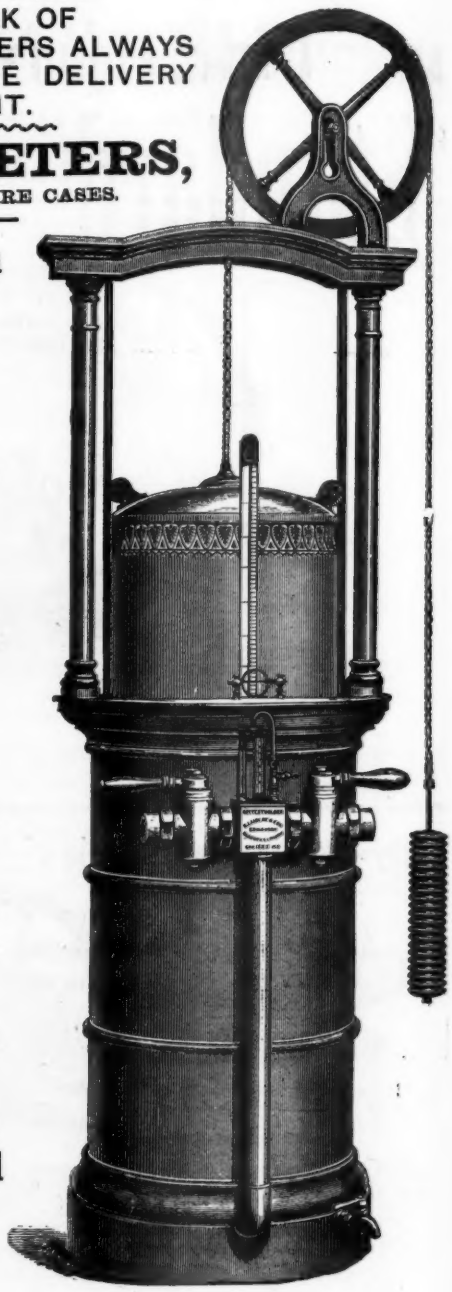
Experimental Hourly-Rate and Test Meters.

Experimental Apparatus.

Pressure Gauges.

Condenser Thermometers.

Siemens' Patent Water Meters, and Gas Apparatus and Fittings.



TEST-HOLDER.

STANDARD TEST-HOLDERS AND TEST-METERS FOR OFFICIAL INSPECTORS, &c.,

AUTHORIZED BY THE BOARD OF TRADE STANDARDS DEPARTMENT.

ALLIANCE FOUNDRY, **GLASGOW.** | SIMON SQUARE WORKS, **EDINBURGH.** | 6, LITTLE BUSH LANE, **LONDON, E.C.**

TANGYES LIMITED

CORNWALL WORKS, BIRMINGHAM.

LONDON: 35, Queen Victoria Street, E.C.
NEWCASTLE: St. Nicholas Buildings.
MANCHESTER: Deansgate.
GLASGOW: Argyle Street.
PARIS: Place de la Republique.
SYDNEY: 119, Bathurst Street.
MELBOURNE: Collins Street West.

SOLE MAKERS OF THE

"SPECIAL" STEAM PUMP

FOR PUMPING

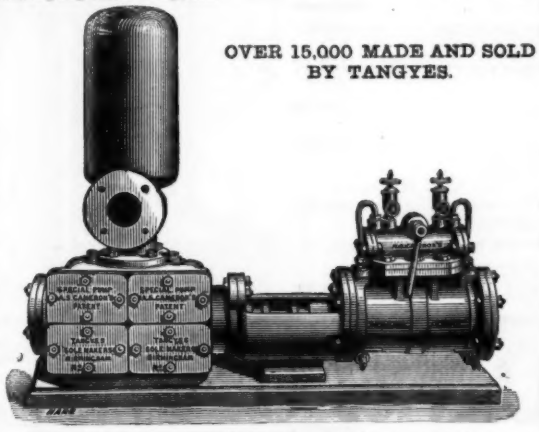
AMMONIACAL LIQUOR, TAR, & WATER IN GAS-WORKS.

Used in the Principal Gas-Works in the United Kingdom.

REDUCED PRICES.

The "Special" Double-Acting Steam-Pump is now made in some 250 sizes, and of many different designs, to suit particular requirements.
In ordering, state the purpose for which the Pump is required, to ensure suitable pump valves being sent.

OVER 15,000 MADE AND SOLD BY TANGYES.



In case of Special Quotations, the following particulars are required:—
Pressure of steam at cylinder.
Number of gallons to be raised in a given time.
The height of lift from level of water to point of delivery.
The nature of the fluid to be pumped.

The "Special" Steam-Pump can be worked by Compressed Air. For pumping Tar or Ammoniacal Liquor, the "Special" Steam-Pump is made with extra long distance piece, for which an additional charge is made.
The quantities of Tar delivered should be taken as about two-thirds those of water given below.

SIZES SUITABLE FOR GAS-WORKS.

Diam. Steam Cyl. ins.	3	3	4	4	4	5	5	5	5
Diam. Water Cyl. "	1½	2½	2	3	4	2½	3	4	5
Length Stroke . . "	9	9	9	9	9	12	12	12	12
Gals. per hour, approx.	450	1800	800	1800	3200	1950	1800	3200	5000
Diameter Suction and Delivery . . . ins.	1	2½	1½	2½	2½	2	2½	3	3½
Price . . . . . £	9	12	11	13	15	15	16	19	22

Diam. Steam Cyl. ins.	6	6	6	6	7	7	7	7	7
Diam. Water Cyl. "	3	4	5	6	3	4	5	6	7
Length Stroke. . "	12	12	12	12	12	12	12	12	12
Gals. per hour, approx.	1800	3200	5000	7200	1800	3200	5000	7200	9800
Diameter Suction and Delivery . . . ins.	2½	3	3½	4	2½	3	3½	4	5
Price . . . . . £	17	20	23	26	19	22	25	28	34

Diam. Steam Cyl. ins.	8	8	8	8	8	9	9	9	9
Diam. Water Cyl. "	4	5	6	7	8	5	6	7	8
Length Stroke . . "	12	12	12	12	12	12	12	12	12
Gals. per hour, approx.	3200	5000	7200	9800	12800	5000	7200	9800	12800
Diameter Suction and Delivery . . . ins.	3	3½	4	5	6	3½	4	5	6
Price . . . . . £	24	27	31	36	43	29	34	39	46

Diam. Steam Cyl. ins.	9	10	10	10	0	10	10
Diam. Water Cyl. "	9	5	6	7	8	9	10
Length Stroke . . "	24	12	12	12	18	24	24
Gals. per hour, approx.	16200	5000	7200	9800	12800	16200	20000
Diameter Suction and Delivery . . . ins.	7	3½	4	5	6	7	8
Price . . . . . £	56	32	37	42	50	60	67

TANGYES' IMPROVED

ROTARY GAS-EXHAUSTER.

These Exhausters are supplied with or without Engine. The smaller sizes (Nos. 1 to 6), when supplied with Engine, are mounted on strong cast-iron base plate—as illustrated—which also carries the Engine.

No.	Cubic Feet per Hour.	Inlets and Outlets.	Horse power of Engine.	PRICE.
1	2,000	3 inches.	2	£60
2	3,000	4 "	2	65
3	5,000	5 "	2	75
4	7,500	6 "	2	80
5	10,000	7 "	3	95
6	15,000	8 "	3	115
7	20,000	9 "	4	125
8	30,000	10 "	6	175
9	40,000	12 "	8	210
10	50,000	14 "	10	260

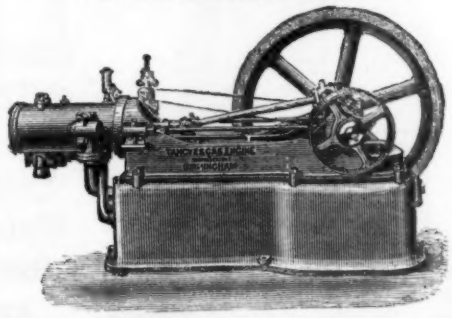
Prices of larger sizes on application.

THE "TANGYE" GAS-ENGINE

(ROBSON'S PATENT)

Royal Cornwall Polytechnic Special Gold Medal, 1882.

(Also for Gas Producer and Feed Pump.)



The ¼, 2½, and 4 horse power sizes are of the type shown in illustration. The 1-horse power size is of the type of the "Tangye" Steam-Engine.

Working size	¼ H.P.	1 H.P.	2½ H.P.	4 H.P.
Test Horse Power	1	1·4	3	6
Revolutions per minute	180	170	170	160
Price, Engine on Base with Tank £	60	82	115	140

Note.—The Test Horse Power in the table above is that given off at the Driving Pulley in actual test with Dynamic Brake at our Works.

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Established 1844.] **ORIGINAL MAKERS.** [Established 1844.

London, 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865. Paris, 1867.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

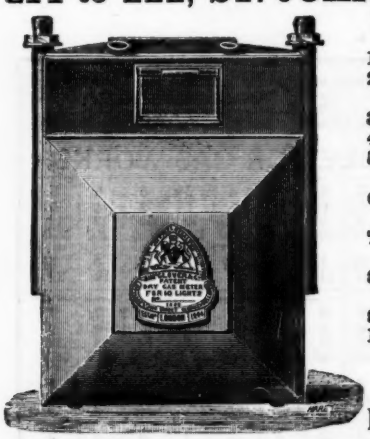
The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.
Since then we have not Exhibited for Prizes.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

TELEGRAPHIC ADDRESS: "GOTHIC LONDON." TELEPHONE No. 6725.



1st—Are a remedy for all the defects of Wet Meters
2nd—Are suitable for all climates, whether hot or cold.
3rd—Incur no loss of Gas by Evaporation.
4th—Cannot become fixed by frost, however severe.
5th—Are the most accurate & unvarying measurers of Gas.
6th—Prevent jumping or unexpected extinction of the Lights.
7th—May be fixed either above or below the level of the Lights.
8th—Cannot be tampered with without visibly damaging the outer case.
9th—Will last much longer than Wet Meters.
10th—Will not cost more than one-half for repair that Wet or Water Meters do.
Are upheld for five years without charge.

Meters fitted with Grey's Index or Harding's Counter.

W. PARKINSON & Co.,

COTTAGE LANE WORKS, CITY ROAD, LONDON.

TELEGRAPHIC ADDRESS: "INDEX LONDON."

NEW DESIGN STATION METER (No. 2 PATTERN).

W. PARKINSON & CO. have introduced the above design of Station Meter in order to meet the demand for a more ornamental Tank. It is simpler in construction than No. 1 Pattern, and consequently less in cost. All joints are planed, the most modern improvements introduced, and the entire Meter is of the strongest and most substantial description.

FITTED WITH

PARKINSON'S PATENT THREE-PARTITION MEASURING DRUM.

MATERIALS and WORKMANSHIP of the VERY BEST QUALITY ONLY. PRICES, &c., ON APPLICATION.

Highest Award, Melbourne Exhibition.

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THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 23, 1889.

THE GAS INSTITUTE BENEVOLENT FUND.

THERE was a meeting on Tuesday last of the donors and subscribers to the Benevolent Fund of The Gas Institute, under the presidency of Mr. G. Garnett, of Ryde. There was a difficulty at the outset in forming a quorum; but this was eventually overcome, and the business was proceeded with. It should be explained that the customary meeting of donors and subscribers to the fund could not be held during the week of The Gas Institute meeting, owing to the same obstacle; but it was then thought advisable to appoint a special day for this business, when a sufficiency of those interested in the cause could be brought together. The operations of this appendage of The Gas Institute have been paralyzed for nearly a year, owing to the disorganized state of the Council of the Institute with which the Committee of the Benevolent Fund was inextricably commingled; and nothing has therefore been done except to continue the relief-grants to the cases requiring assistance. For some years past efforts have been made by various members of The Gas Institute and subscribers to the Fund to procure a settlement of the affairs of the latter upon some formal basis; but the general indifference of the majority to the subject has prevented anything of the kind being done. The Finance Committee of The Gas Institute have acted for the Benevolent Fund; and the Secretary has practically transacted all the business without troubling anybody about it. It is evidently desirable, however, that the matter should be put upon a sound footing; and this is a question which the new Committee will doubtless take into consideration before the next general meeting takes place. A special meeting was also held on Tuesday for the election of Trustees, as to which there has been some little confusion. Mr. George Livesey and Mr. Thomas Newbigging, who were former Trustees of the Fund, were assumed to have relinquished this position at the same time that they resigned their membership of The Gas Institute; but this appears to have been a mistake. As a matter of fact, Mr. Livesey, and we believe Mr. Newbigging also, has maintained the independence of the organization of the Benevolent Fund as being something in relationship with, but yet distinct from the Institute. Anybody who knows either gentleman will understand that abandonment of a trust committed to him on behalf of the poor and needy would be the last course he could take; and it is also only what might be expected that as soon as their views of their position had been expressed, their colleagues should heartily agree with them. They have therefore been confirmed in their responsibilities; and there is not a gas man in the kingdom but will concede that here at least is an example of the right men being in the right place. We are reluctant to leave this subject of the management of The Gas Institute Benevolent Fund without earnestly recommending all members of the profession, whether inscribed on the roll of the Institute or not, to consider its constitution and objects. It is perfectly true that the Fund has been fairly well supported in the past; but there has been a lamentable lack of interest on the part of members generally in its administration. Although this apathy may be looked upon as implying complete confidence in the worthy gentlemen who have taken the active part in dealing with the funds and doles, yet it is not satisfactory even to them, because it leaves an opening for cavil from outsiders who may never have given a farthing towards the Fund, but who are always ready to disparage the motives of the two or three men whom they see constantly discharging duties to which their colleagues appear indifferent.

With regard to the claims of the Fund upon members who may be in a position to subscribe much or little towards it, there is surely no need for advocacy at this time. Yet we would say a word for it. The great glory of benevolence is its spontaneity; and nothing redeems human nature more potently, in the estimation of a philosopher inclined to take a cynical view of men and their doings, than the readiness with which they respond to a cry for help on behalf of a stricken fellow. It is the weakness of this quality, however, that it acts, as one may say, through the heart rather than the head. Benevolence flows most freely when the emotions are touched. Reason seems to check it. No thoughtful observer can fail to have been struck with the great difference that circumstances make in the benefits derived by sufferers from the benevolence of their kind. A father of a family shall go on the river for a pleasure excursion, and, falling overboard by himself, be drowned. The fate of his widow and orphans does not impress the public mind; and they may go to the workhouse for all that the benevolence that moves by impulse will do for them. A hundred such cases may, and probably do, happen in different parts of the kingdom every summer; and nobody takes any notice of them. Let the same number of victims be gathered together and suffer at once, however, and the community is shocked into helping the survivors with a lavish hand. This is altogether illogical, of course; but it is human nature, and the fact must be reckoned with. What we should say on the subject is, "Do not close the way to your sympathies for sufferers "by wholesale; but make, in addition, systematic provision

"for the less sensational, but equally mournful singular "cases of disaster that occur in obscure corners every day." This latter is what the Benevolent Fund of The Gas Institute enables members of the profession to do. If, therefore, men who can perceive the advantages of systematic aid as compared with spasmodic benevolence do not help this Fund by their money, and even more by their interest, they must assuredly lie under the reproach that reason has chilled their sympathies.

THE INCREASED DIVIDEND OF THE GASLIGHT AND COKE COMPANY.

The announcement which we publish elsewhere that the Directors of The Gaslight and Coke Company intend to recommend a dividend for the past half year at the rate of 13¾ per cent. per annum, carrying forward a balance of £285,956, will be received with a sense of gratification not wholly unmixed with wonder. It would be premature now, before the publication of the accounts and the explanations at the meeting, to offer any commentary upon the announcement beyond congratulating the Directors and proprietors upon the success that has evidently attended their policy of reducing the price of gas in the Company's district. This preliminary declaration will have the effect of awakening interest in the proceedings of the general meeting. Colonel Makins, M.P., the Governor of the Company, will have no lack of interesting topics on this occasion. The increased dividend, the growing prosperity of the Company, the partial abolition of the Coal Dues, the advanced cost of coals, the extra payments on account of wages in the carbonizing department—all these, and perhaps several other topics of the time, will have to be dealt with, and their mutual actions and reactions explained to the assembled shareholders. Colonel Makins knows that at these meetings he speaks not only to the proprietors of Gaslight and Coke stock, but through them to the world at large. He occupies the position of exponent of the financial side of gas making; and, to do him justice, he is always laudably anxious to make his official statements as intelligible and complete as possible. It is not with the slightest desire to appear to suggest to Colonel Makins what he should talk about that we allude to the matters mentioned above; but it is certainly well understood by him and his advisers in the Company that the public would like to hear some authoritative pronouncements respecting those incidents of London gas supply of which they have lately gleaned partial and mystifying rumours from the daily newspapers. Apart from this consideration, these are emphatically times when a great increase in the dividend-paying capacity of the largest gas undertaking in the world requires to be explained in the public ear, which is too often taken by fleeting cries intended to inspire the opinion that gas property has seen its best days.

GAS COMPANIES AND THE RAILWAY AND CANAL TRAFFIC ACT.

Mr. J. Deakes, of Worcester, whose attempts to defeat what he regards as the machinations of the Railway Companies under the Railway and Canal Traffic Act, 1888, to injure the gas interest have been repeatedly mentioned in this column, has secured the collaboration of Mr. Maurice Pollack, Chairman of the Birmingham Corporation Gas Committee, together with that of the Town Clerk (Mr. E. O. Smith), the Secretary of the Gas Department (Mr. Edwin Smith), and Mr. Alfred Colson, Gas Engineer of the Leicester Corporation, who have formed themselves with him into a Railway Rebates Provisional Committee. A preliminary conference upon the subject to settle the grounds of that combined action in the matter which Mr. Deakes has been so anxious to secure, has been held in Birmingham, and Mr. Edwin Smith is now prepared to receive adhesion to the movement. A circular, drafted on the lines of that recently issued by Mr. Deakes (*see ante*, p. 22), has accordingly been issued, inviting (1) contributions to a Guarantee Fund from which the costs of separate proceedings before the Railway Commission, or proceedings in combination with the coal-owners, may be defrayed; (2) the appointment of representatives to attend a conference to be held at the Birmingham Corporation Gas Offices on Thursday afternoon next, when the future course of action will be decided. The Corporation of Birmingham have declared their willingness to contribute a sum of £50 to the Guarantee Fund. It is scarcely necessary for us to urge upon Gas Companies interested in this question of railway rebates the advisability of taking, or at least discussing, united action to obtain a favourable settlement of the difficulty that Mr. Deakes has brought to light. It is simply a matter of pounds, shillings, and pence to them; and if they are supine when their monetary interests are threatened, it is their own fault if they suffer loss in the end. Mr. Deakes has done his best to put the question clearly before his fellow gas managers similarly situated; but it is not for the Worcester Gas Company to do everything single-handed, even if this were possible.

THE COMMERCIAL GAS COMPANY AND THEIR STOKERS.

A Manifesto has been issued by the Directors of the Commercial Gas Company upon the subject of their stokers' work and wages, which is doubtless intended to be regarded as their last word to the men. This statement fully bears us out in our last week's remark that the Board, through Mr. H. E. Jones, have shown willingness to treat their men fairly, but have been met by greater demands than those put forward by the retort-house hands of the other London Gas Companies. The Directors now repeat that they are willing to place their men upon an equality with the men of other Companies, but fail to see why they should go beyond these terms. They therefore offer an eight-hour shift, with 72 retorts as the work for a three-handed gang and a barrow-man, for ground-floor retort-houses. The pay of scoop-drivers is to be increased to 5s. 7d. per day; time-and-a-half is to be paid for Sunday labour between 6 a.m. and 6 p.m.; and the eight-hour shift is extended to all classes of labour working through the night with the stokers. It is remarked that the comparatively small size of the Company's stations renders these concessions more costly to them than similar dispositions are to the other Companies. It is to be supposed that the Commercial men will be reasonable in the matter, and not reject terms which must be regarded as liberal, in the vain attempt to seize a little more than the retort-house hands in any other service enjoy. By this time next week we expect to be able to record that the stokers' movement has come to an end in every part of London. It has been conducted, on the whole, with great forbearance and good spirit on both sides; and if one result is to postpone for a few months reductions in the price of gas, we do not believe the consumers generally will begrudge the small sacrifice, if it does good to the men.

THE FORTUNES OF THE LAWRENCE AUTOMATIC GAS COMPANY.

It is some time since we had any news of the Lawrence Automatic Gas Company, or of the great American inventor after whom the Company is named, or his German Chairman, Mr. C. H. M. Bosman. The last has not been heard of this remarkable concern, however, for the Joint-Stock Acts of the country perform at least one useful duty—they enable one to follow the course of a speculation of this kind from its heyday to its grave. Things have not yet arrived at the worst with this Company; but the days of "chicken and "champagne" to newspaper reporters are over with it. The first ordinary general meeting was held last Wednesday, Mr. Bosman in the chair; and the report submitted was anything but encouraging. There had been "difficulties," it was admitted, owing to the worthlessness of the original gas-making machine sold to the promoters by Mr. Lawrence, which had caused the first concessionary Company formed by the parent association to object to payment of the stipulated purchase-money. Now, however, a new apparatus has been devised by the Company's Engineer—presumably for nothing—of which great things are expected. Meanwhile, where is Mr. Lawrence? Echo, in the City, would answer "Where?" He is enjoying his share of the money which he and some others succeeded in obtaining from the public. Driving a smart phaeton in the Park possibly suits Mr. Lawrence much better than facing a crowd of disappointed shareholders in the City. Mr. Bosman told the meeting that he hoped the Directors would be able to recommend a dividend in six months' time—the old story of the "good "time coming." It was ostentatiously declared from the chair that the Directors had not taken, and would not accept any remuneration by way of fees, until the Company are able to pay a dividend; but everybody knows how much this species of self-denial is worth. If Directors of speculative Companies had to look to fees alone for their recompense, it would not be so easy to man boards as it is at present. How long or how short a period will elapse before the Lawrence Company are entered in the list of the Court for the purpose of winding up, and what vicissitudes may precede that consummation, we cannot say; but that such will be the end, and this without the preliminary payment of a penny of dividend out of the profits of working, there does not

seem to be a shadow of doubt. The scheme never had the slightest justification in fact, as we were careful to state from the first. It was an old notion, dressed up in a new disguise, and was bound to experience the old fate, from which not all the newspaper eulogies that could be obtained by methods well known to "promoters" could save it.

THE REPORT OF THE CHIEF INSPECTOR OF ALKALI, ETC., WORKS.

THE Chief Inspector of Alkali, &c., Works (Mr. A. E. Fletcher) has issued his annual report—being the twenty-fifth in the series—upon the proceedings taken under the Act relating to these establishments for the year 1888. As briefly stated by the Inspector in his opening paragraph, this record relates to the control that has been kept over the emission of noxious gases from those chemical works which come within the scope of the Act. There is no very great change in the number of processes which came under inspection during the years 1887 and 1888. The tendency is for the large works to grow bigger, and for smaller ones to shut up; just as in other trades, in these days of capital and machinery. In several instances the Act has been infringed by chemical manufacturers; but the Inspector lays particular stress upon the fact that the object of Government inspection is not so much to collect evidence for a prosecution as to help the manufacturer to satisfy the requirements of the law. One beneficial result of the operation of the Act is that manufacturers have been induced to maintain a constant system of testing the effluent gases from their various apparatus *and to employ the best skilled assistance they can obtain for the supervision of the work*. The italics are ours, and point out the important result that the necessity of satisfying Government inspection in the chemical trades is admitted to be a powerful motive for breaking with the "rule-of-thumb" methods of the uninstructed foreman, and putting processes under the control of educated superintendents. After a manufacturer has got into trouble once or twice, he begins to consider the advisability of taking more care in the future; and this can only be done by instituting, for his own protection, a system of testing that cannot be worked except by a trained chemical assistant for whom he would not previously find employment. In his references to the treatment of alkali waste, the Inspector mentions favourably the adaptation by Messrs. Chance Brothers of the Claus sulphur-recovery process, and expresses himself hopefully of the prospect of getting rid of this objectionable residual of the Leblanc soda process. With regard to the manufacture of sulphate of ammonia, it is remarked in the report that the main source of this product is still "gas liquor;" but among other sources of greater or less importance are named the distillation of shale, the gases of iron-smelting furnaces, coke-ovens, and the distillation of bones in the manufacture of animal charcoal. Taking the sulphate produced from all sources together, the Inspector values it at £1,478,420 a year, all of which was formerly wasted. This fact is mentioned as being of "general interest and utility, and as an encouragement to those who would adopt means for saving the waste products of manufacture." The chief points of this and other portions of the report are given elsewhere, and will be further dealt with next week. Notice should be especially taken of the statements with regard to the ordinary methods of dealing with sulphuretted hydrogen. For small works the Inspector recommends absorbing the gas by hydrated peroxide of iron, and gives particulars of the arrangement of the purifiers for the instruction of those interested in this subject. There is a section of the report devoted to the question of black coal smoke which deserves attentive reading. It is too long to be paraphrased here; but specially noticeable is the Inspector's contention that where there is black smoke there is also likely to be carbonic oxide gas, and that absence of the one means absence of the other. There is a useful table of 52 named examples of coal furnaces, fired by hand and mechanically, burning all sorts of coal, with analyses of the smoke gases attached, which we may look to see quoted very frequently in future discussions of smoke abatement. If solid fuel is used, the Inspector is in favour of mechanical stoking; but he evidently prefers a system of gaseous firing to any means of burning coal in its raw state, and particularly favours a gas-producer elaborated by Mr. Mond, by which the ammonia of the fuel may be saved. Mr. Mond's furnace must be a very remarkable one to justify the encomiums passed upon it in the report, which not only praises the furnace itself, but also the discipline by which the working stoker has been trained in the use of Bunte's smoke-testing apparatus. Of course, there is supervision of the testing by a competent chemist; but constant experience has so "skilled his (the stoker's) eye that he can "regulate the supply of gas by the appearance of the flame so "as to be within 1 per cent. of carbon monoxide on the one "hand or of oxygen on the other." In order to discover a perfect smokeless coal furnace, the Inspector says he has visited the Continent as well as searched through this country, apparently in vain. He suggests, therefore, that a competitive trial of smoke-preventing furnaces should be held under test conditions, and believes that such an exhibition would be useful in the highest degree. It would likewise be expensive; and it is by no means clear where the money for holding it could come from. Here is a chance, however, for some moneyed millowner to distinguish himself.

TITLE AND INDEX TO VOL. LIII.—In accordance with previous arrangements, the title-page and index to Vol. LIII. (January to July, 1889) will not be issued as part of the JOURNAL. It will, however, be ready in the course of the present week; and a copy will be forwarded post free by the Publisher on receipt of a post-card from any subscriber.

PRESENTATION TO MR. G. R. STRACHAN.—Last Tuesday afternoon, Earl Cadogan, on behalf of the members of the Chelsea Vestry, presented to Mr. G. R. Strachan, their Surveyor, who is about to resign his position, an illuminated address, an oak writing-table, and a silver tea set, in recognition of his services to the Vestry and the parish.

THE PROGRESS OF THE WARRINGTON CORPORATION GAS UNDERTAKING.—The abstract of the accounts of the Borough Treasurer of Warrington (Mr. C. Chorley), which has just been issued, contains an interesting statement, prepared by Mr. Voisey, a member of the Town Council, in regard to the progress of the gas undertaking since its acquisition by the Corporation in 1877. It shows that the total profit realized has been £135,418.

THE GAS LIGHTING OF JOHANNESBURG.—We learn that a letter was received last week by Mr. T. Newbigging, the Engineer of the Johannesburg Gas Company, from Mr. W. Carr, who, it may be remembered, has gone out to superintend the erection of the works which Mr. Newbigging has designed for the supply of that town with gas, that the prospects of the undertaking are excellent. The place is growing enormously.

THE ALLEGED BREACH OF THE GAS DISTRICTING ARRANGEMENTS IN THE METROPOLIS.—The appeal of The Gaslight and Coke Company in their action against the South Metropolitan Gas Company, for an alleged encroachment on their district by supplying gas to the South-Western Railway Station at Nine Elms, which was decided in favour of the latter Company by Mr. Justice Kekewich, whose decision was subsequently confirmed by the Court of Appeal, came before the House of Lords last Friday, and was partially heard by the Lord Chancellor, Lord Herschell, and Lord Fitzgerald, and then adjourned to Thursday next. The Counsel engaged in the case are Sir Charles Russell, Q.C., M.P., Sir Horace Davey, Q.C., M.P., and Mr. Danckwerts, for the appellants; the Attorney-General (Sir R. E. Webster, Q.C., M.P.), Mr. Rigby, and Mr. Prior, for the respondents

APPOINTMENT OF MR. T. A. GUYATT AS ASSISTANT-MANAGER AT MONTE VIDEO.—Mr. Thos. A. Guyatt, eldest son of Mr. T. Guyatt, Secretary of the Ceará Gas Company, has been appointed draughtsman and general assistant to the Manager of the Monte Video Gas Company (Mr. John Ohren), and will leave England on the 15th prox. to enter upon his duties. He was for twelve months at the Crystal Palace School of Practical Engineering, and from there went to the foundry of Messrs. Henry Balfour and Co., at Leven, Fife, where he served a regular apprenticeship in the pattern, fitting, and boiler shops and drawing office—obtaining a good certificate at the end of his term. Since his return to London he has been with Mr. C. C. Carpenter at the Vauxhall station of the South Metropolitan Gas Company. Mr. T. A. Guyatt is a student of the Institution of Civil Engineers, and was recently elected a member of the Students' Representative Committee.

THE ASSESSMENT OF THE SUNBURY GAS WORKS.—Last Saturday application was made to the Middlesex Quarter Sessions by Mr. Bulkeley W. Williams (Solicitor to the Sunbury Gas Company) to confirm an amended valuation of the Company's works and mains according to the figures produced by Mr. Marshall. The works and mains of the Company are mostly in Sunbury Parish, part of the Staines Union, and for some years have been rated at £221; but in consequence of the Company erecting a large holder, the authorities reassessed the property at £403. This enormous increase met with determined opposition; and the Secretary (Mr. E. Sandell) was asked to prepare figures showing the correct rateable value. The result was that the Company appealed to the Union Assessment Committee, who fixed the sum at £292. The Company, still feeling aggrieved, entered an action at Quarter Sessions; upon which the Assessment Committee called in Mr. Marshall, who valued the works and mains at £215. Thinking that the difference between Mr. Sandell's figures and those of Mr. Marshall was not worth fighting over, the Company consented to the last-named sum; and thus, instead of being raised by £182, are actually lowered £6, and the decision is to carry costs as against the Assessment Committee. The Company and their Directors, Secretary, and Solicitor are to be congratulated upon the satisfactory termination of the matter.

Water and Sanitary Affairs.

THE sale of an entire and undivided "Adventurer's share" in the New River Company, of which we give an account in another column, has served as a text on which *The Times* has founded some rather striking remarks as to the growing value of the Metropolitan Water-Works. The rejection of the bargain negotiated on behalf of the Government by Mr. E. J. Smith several years back, for the purpose of transferring the London Water Supply to a body of Trustees, is now discussed in terms very different from those indulged in when the Metropolis Water-Works Purchase Bill was before Parliament. The enormous price—no less than £122,800—paid for the single share sold at the Auction Mart, last Wednesday, has encouraged a conviction that the terms proposed for buying up the undertakings of the Metropolitan Water Companies in 1880 were by no means so extravagant as the people of London were at the time led to believe. We are told it was then "assumed" that an excessive sum was to be paid to the Companies for their "prospective rights." In fact, the entire negotiation was condemned; and there was a general outcry on the part of the Press against the price that was to be paid for the undertakings. Sir William Harcourt led the attack in Parliament; and it is acknowledged that Lord Beaconsfield's Government "suffered severely" in consequence of the general belief that the Companies were going to be bought out at too dear a rate. After the lapse of years, a different view of the case has come to pass. "It is now evident," says *The Times*, "that the rapid increase in the price of water shares which "was attributed to the extravagant offers of the Ministry, has "been since continuous." But the Press refused to anticipate this at the time; and Mr. E. J. Smith went down to the grave under the stigma of having devised a preposterous scheme, which, if adopted, would have inflicted a great pecuniary wrong on the inhabitants of the Metropolis. Too late for the public good, it is discovered that the opponents of the project, and not its advocates, were in error; and the leading organ, which tore Mr. Cross's scheme to tatters in 1880, is constrained to say: "If the Water Companies were now to "be bought out by the Government or the County Council, a "much larger sum would have to be paid than it was proposed "to pay nine years ago." The force of this conclusion is not affected by the circumstance that the Adventurer's share which has just been sold derived part of its enormous value from the landed estates of the Company, including a mass of house property in Clerkenwell, whereas all this was "excepted" from the bargain negotiated by Mr. Smith. *The Times* must be supposed to refer to this circumstance when it says: "The sale of this New River share—though it is not "denied that this was an exceptional property—gives some "measure of the selling value of water shares." There is another very significant test, in the fact that the receipts of the New River Company for water have risen from £268,238 in 1869, to £511,356 in 1888; and *The Times* itself admits that "there is no reason to suppose that this upward "movement will be reversed in the near future." An "inde-"pendent competitive scheme" for all London, or any part of it, has never yet taken practical shape; and it is suggested that Parliament is not likely "to set aside, without compen-"sation, the monopoly secured, in the case of the New River "Company, by Royal Charter and Act of Parliament." Neither does *The Times* contemplate an early renewal of the attempt in 1880 to buy out the Water Companies—an attempt which would have to be made "under less favourable circum-"stances" than at the earlier date. This is said "despite "the ambitious views of the London County Council." At the risk of repeating something that we have stated before, we feel compelled to say that the history of this water question serves to show how very little the people of London know of their own local affairs, and how easily they are misled on such topics by the clamour of the Press and the pretentious utterances of agitating politicians. It is amusing to see how the Press will sometimes turn round and chide the public for believing what the scribes at one time confidently declared. It would appear, in regard to the subject of the Metropolitan Water Supply, that in 1880 all the oracles were wrong; and now they are beginning to find it out.

MR. F. J. BANCROFT, Assistant-Manager of the Barnet District Gas and Water Works, is one of the First Division on the list just published of the successful candidates at the June matriculation examination of the University of London.

The Gas Institute.

MEETING OF THE DONORS AND SUBSCRIBERS TO THE BENEVOLENT FUND,

A Meeting of the Subscribers and Donors to the Benevolent Fund of The Gas Institute was held last Tuesday, at the Westminster Palace Hotel. The PRESIDENT (Mr. G. Garnett, of Ryde) occupied the chair.

The HONORARY SECRETARY (Mr. W. Longworth, of Guildford), at the outset, announced that there were only three contributors to the fund present; and he suggested that, in order to form a quorum (ten), other gentlemen present should subscribe.

This having been done,

The PRESIDENT observed that his name already appeared as a donor; but he had come prepared to hand to the Honorary Secretary £5 towards so grand an object as the Benevolent Fund. Proceeding, he said he was glad to see so many of his professional brethren together on the occasion. They were about to enter on business; and all he could say was that he trusted that the peace which had reigned for a considerable period of time—for weeks and months—would prevail in their counsels, and that the end would be success to The Gas Institute. Having said this, he would call upon the Secretary to read the minutes of the last meeting.

The HONORARY SECRETARY then read the minutes of the meeting held on June 14, 1888,

The PRESIDENT said there was nothing in those minutes which would give rise to discussion; and he would simply propose their adoption.

This having been agreed to,

The HONORARY SECRETARY stated that the accounts had already been sent to the subscribers and donors; and he then read the following report of the Benevolent Fund Committee:—

The Committee beg to report that the subscriptions for the quarter ending Dec. 31, 1888, amount to the sum of £104 14s. The dividends arising from investments are £59 8s. 11d.; and the following donations were also received:—F. Darlington, £10 10s.; C. Gandon, £10; and G. Livesey, £3—making the total receipts £187 12s. 11d.

The sum of £170 4s. was expended by way of relief-grants to nine cases requiring assistance; and £13 1s. was spent in items of stationery, travelling expenses, &c.

Applications have been received for continued relief; and the same will be laid before your Committee at their next meeting.

At the special general meeting now to be held, you will be called upon to elect two Trustees.

The resignation of several members of the Committee during the past year has prohibited a legal meeting being held; consequently no business has been transacted beyond the simple payments to the relief cases decided upon in June, 1888.

The PRESIDENT moved—"That the report and accounts be received and adopted."

Mr. G. LIVESEY called attention to the paragraph in the report which stated that the meeting would be called upon to elect new Trustees. He believed the Trustees had not resigned.

The PRESIDENT observed that they would come to that matter directly.

The motion was agreed to.

The meeting was then made special.

The PRESIDENT said he had now the honour (and he said it with all good faith) to propose—"That Messrs. George Livesey and Thomas Newbigging be elected Trustees of the Benevolent Fund." He was quite sure that if they searched north, south, east, and west, they would find they would receive a unanimous verdict in favour of this proposition. Everybody who knew Mr. George Livesey was aware that he was a friend to those who could not help themselves; and everybody who was acquainted with Mr. Newbigging knew that he followed the same suit.

Mr. R. MITCHELL (Edinburgh), in seconding the proposition, said two names could not be mentioned that would meet with more acceptance than those which were before them.

Mr. T. DUXBURY (Darwen) remarked that he understood Mr. Livesey to say—and he (Mr. Duxbury) believed it to be perfectly true—that he and Mr. Newbigging had not resigned from the trusteeship. If there was any doubt about it, there could not be any harm in re-electing them. Their Solicitor (Mr. Radcliffe), however, had suggested that the words of the resolution might be "that they be continued as Trustees"—not "elected."

Mr. T. T. MARKS (Llandudno) acquiesced in this suggestion.

Mr. LIVESEY remarked that both Mr. Newbigging and himself were willing to continue as Trustees.

The PRESIDENT said they had the utmost faith in Mr. Radcliffe. He had guided them through many difficulties, and

he was present that day as their friend and legal adviser. He should, therefore, have pleasure in proposing—"That Messrs. George Livesey and Thomas Newbigging be continued Trustees of the Benevolent Fund."

The motion was agreed to.

Mr. DUXBURY said there was one matter he should like to call attention to respecting the rules. Under the head of "Management," it stated that "for conducting the affairs of fund there shall be a 'Committee of Management,' consisting of the President for the time being of The Gas Institute as Chairman, three members of Finance Committee," &c. Then in the next rule, it stated: "There shall be a Finance Committee, consisting of the members of the Finance Committee of The Gas Institute for the time being." They were in the position that day of having expunged the rule of the Institute (No. 8) which provided a Finance Committee of three members; and they had no Finance Committee so appointed now. Consequently it would alter the Benevolent Fund rule. He did not know whether or not this was a meeting at which they could consider the matter.

Mr. RADCLIFFE expressed the opinion that the matter must remain over for a future meeting. They had only met that day to elect two Trustees; and he was afraid they could not then go further into this question of the rules. It would be perfectly competent for them to do so at any other time. What Mr. Duxbury had said was quite true. The alteration of one rule did involve an alteration of the other.

Mr. DUXBURY suggested that the Benevolent Fund Committee should take into consideration the question of altering the rules of the Fund in accordance with the Institute rules before the next meeting; and he proposed a resolution to this effect.

After some further discussion,

Mr. RADCLIFFE said it occurred to him that if any additional alterations were proposed in the Institute rules, they would probably lead to many slight modifications in the rules of the Fund; and he thought it might be well to let the matter stand over until the rules of the Institute were finally settled, and then shape the Fund rules in accordance therewith.

The PRESIDENT concurred in Mr. Radcliffe's suggestion.

Mr. G. LIVESEY said he wished to thank those present very cordially for the manner in which they had passed the resolution in regard to the trusteeship. He could only express again—as he had often had occasion to do at previous meetings of gas managers—his sense of the kindness that had been manifested towards him personally. He hoped that the Benevolent Fund would continue to be of use to those brethren who were not in so fortunate a position as themselves. As to the rule which they had been considering, an ordinary meeting of the subscribers and donors could give some instructions to the Committee of Management to carry on the business of the Fund. Seeing by the rule that the Finance Committee was supposed to administer it, it would, of course, be understood that the Committee would do that until the rules could be so altered as to accord with the rules of the Institute.

The PRESIDENT having suggested that they should return to the ordinary business,

The HONORARY SECRETARY reported, on the authority of the Scrutineers, that Messrs. R. Hunter (Chester), C. S. Ellery (Bath), T. T. Marks (Llandudno), and W. Syms (Rochester), had been elected members of the Benevolent Fund Committee. Replying to Mr. Duxbury, he said that Mr. Folkard and Mr. Winstanley were the other members of the Committee.

On the proposal of Mr. DUXBURY, seconded by Mr. LIVESEY, a vote of thanks was passed to the President for conducting the business of the meeting.

The PRESIDENT having acknowledged the compliment,

Mr. R. FISH (London) moved a vote of thanks to Messrs. G. Livesey, T. Newbigging, and W. J. Warner for their past services as Trustees of the fund.

Mr. T. T. MARKS seconded the motion, which was unanimously agreed to.

Mr. LIVESEY, having responded for himself and his colleagues, said he thought their thanks were due to Mr. Longworth and those members of the Council who, during the *interregnum*, had taken up the duties connected with the Fund, and carried them on so satisfactorily.

Mr. MARKS proposed, and Mr. W. SYMS (Rochester) seconded, that the thanks of the meeting be given to Mr. Longworth for his services.

The PRESIDENT, in a few well-chosen words, supported the proposition, which was carried.

The HONORARY SECRETARY having acknowledged the vote,

The business of the meeting concluded.

Essays, Commentaries, and Reviews.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(FOR STOCK AND SHARE LIST, see p. 180.)

PRICES in general were firmer at the opening of the Stock Markets last week, and there was every promise of improvement; but as the week passed on the tendency went the other way. Business was quiet, and most markets drooped. The approach of the holiday season is beginning to make itself apparent; and after the next account the quiet time will be fairly setting in. Gas and Water securities have, as usual, shown an exception to the prevailing tendency, and (if we leave out one or two Foreign undertakings in the former class) have displayed considerable advances. Foremost come the three Metropolitan Companies, which usually rise about this period, when the dividends are getting almost in sight. The announcement of the Directors of The Gaslight and Coke Company that they will recommend the maximum rate of dividend (an advance of ¾ per cent.) has put Gaslight "A" up 2 more; but the movement had already been discounted some time. We must assume that the responsible managers of this Company are in possession of information which in their opinion justifies the declaration of this dividend; but until we are better informed, we cannot but entertain a doubt as to the wisdom of this policy at a time when the Company has to look forward to dearer coals, higher wages, and increased competition. South Metropolitans have been only moderately dealt in; but both "A" and "B" have risen freely. In Commercials, the old has marked 270, at an advance of 2; and the debenture has realized top price. Suburban and Provincials offer nothing calling for notice. Foreigners have been irregular. Monte Video has risen ¼, and Bombay seems inclined to pick up again; but Imperial Continental has fallen back 1. Pará has suffered the large fall of ½, and Oriental has not regained strength. The Water Companies have been quiet, but show steadily increasing strength. Lambeth debenture is 1 higher, the demand for such securities being evidenced by the fact that the new issue of £25,000 debenture stock realized an average of 124¼. Another noteworthy incident is the sale of an Adventurer's share in the New River for £122,800. At last year's rate of profits this price returns only 2½ per cent.

The daily operations were: Good steady business in Gas on Monday, with rising prices, though the only actual change in quotations was an advance of 2½ in South Metropolitan "B." Water was little dealt in at middling prices. There was rather less done in Gas on Tuesday, except in Gaslight "A," which rose 1. Imperial Continental was easier. Water was no brisker, but prices were rather harder. Business was mostly in Gaslight "A" on Wednesday, and the quotation rose 1 more. Commercial old advanced 2; South Metropolitan "A," 2; and ditto "B," 1. Pará fell ½. Nothing was done in Water; but Lambeth debenture rose 1. There was more activity in Gas on Thursday, particularly among the Foreigners. Imperial Continental fell 1. Water was in demand, and commanded good figures. Chelsea and West Middlesex rose 2 each; and Grand Junction, 1. Gas continued active on Friday, and everything dealt in made a good price. South Metropolitan "A" marked 324, and rose 1. Monte Video also advanced ½. Water was strong, though only moderately active. Kent rose 2½; and West Middlesex, 1. Saturday's Gas business was quiet, but not less firm; and the same may be said of Water. In both classes all quotations closed without further change.

ELECTRIC LIGHTING MEMORANDA.

ALTERATIONS AND AMALGAMATIONS OF ELECTRIC LIGHT COMPANIES—THE BUSINESS OF THE EDISON-SWAN COMPANY—THE COMPARATIVE COST OF ELECTRIC AND GAS LIGHTING—THE GASLIGHT AND COKE COMPANY'S OPPOSITION TO THE LONDON ELECTRIC LIGHT ORDERS.

THE notorious old "Grandfather" Brush Company have decided to turn over a new leaf, and will signalize the fact by a change of name. The opportunity for making this fresh start has been found in the successful issue of the mortgage debentures offered for subscription last April, by which means fresh capital was found for extending the Company's manufacturing operations. So many new conditions of electrical working have cropped up since the Company was started, that it has been found advisable to reconstitute the whole concern by transferring all its assets and liabilities to a new Company, to be called the Brush Electrical Engineering Company, Limited, with extended Memorandum and Articles of Association. The capital of the new Company is to be £750,000, divided into 150,000 six per cent. preference shares of £2 each, and 150,000 ordinary shares of £3 each. The proposal for transfer is on the basis of allotting to the shareholders of the existing Company one preference and one ordinary share in respect of every £5 fully-paid share at present held by them. These electrical concerns are always shuffling the cards for a fresh deal. A great combination of all the Woodhouse and Rawson interests under one head has just been announced. We suppose that this financial conjuring is necessary and desirable; but it is at least noteworthy, and should signify that the parties concerned have a good deal of spare cash to spend upon lawyers, accountants, and the other clever gentlemen who design and carry out these dazzling operations. It seems to be the ordinary course that when an electrical venture catches the public favour, the first thing to be done is to split off as many subsidiary or concessionary scions as possible. Then, after a pause, the next step is to gather all these scattered members together again. As we have already remarked,

this sort of thing must be all right and proper, since it is so commonly done; but it looks peculiar economy until one is used to it.

The report of the Directors of the Edison and Swan Company for the past year states that a satisfactory trade has been done in the sale of lamps and fittings, resulting in a credit balance of £47,729, to which must be added £25,123, the balance for the year ending June, 1888; thus making a total of £72,852, out of which the Directors have appropriated £28,815 to meet losses on the final disposal of sundry lighting installations taken over at the date of the amalgamation. With this statement before one, it is needless to further inquire why the Company propose to stick to lamp selling for the future, and to leave lighting contracts to those who may like them. It should be recorded that the Chairman of the Company, Mr. J. S. Forbes, has lately joined the Board of the London Electric Supply Corporation, assuming in the latter the position of Vice-Chairman of the Directors and Chairman of the Finance Committee. Mr. Forbes must possess wonderful capacity for work, seeing that his manifold directorial engagements betray a constant tendency to increase. His taking charge of the London Electric Supply Corporation at this critical period of their history, when they are spending money like water on the Deptford station, which may or may not turn out a success, is significant. It looks very much as though the Board had sorely felt their need of strengthening in case of there being troublous times ahead. Mr. Forbes has made his bow to the shareholders at an extraordinary general meeting, which might have been called for the purpose. It was stated at the meeting that henceforth the Company's accounts would be made up on the lines laid down by the Board of Trade, which mainly follow the model of gas companies' accounts.

In last week's JOURNAL, we reproduced the substance of a paper on electric lighting read by Mr. E. J. Silcock, of King's Lynn, before the recent annual congress of the Association of Municipal and Sanitary Engineers. There is not a great deal in the paper, which is essentially a compilation from previously published statements; the author borrowing largely from information relating to the Leeds electric lighting experiment. He concluded his remarks with a recommendation for corporations to embark in electric lighting; but we cannot concede that the paper is worthy of much respect as a proof of the wisdom of such a course, whatever may be the author's other claims to be regarded as a competent adviser upon the matter. What we are most concerned with in connection with this statement is the comparison put forward by the author of the probable cost of electric lighting and of gas in London when the pending Orders are settled and the various companies at work under statutory conditions. He says that in all probability the consumer of large quantities of electricity will be charged 6d. per unit, "which is equivalent to gas at 3s. 9d. per 1000 cubic feet." Now, we are accustomed to peculiarly worked-out equivalents for electric lighting charged at per unit and gas at per 1000 cubic feet; and although we should make the equivalent in this case $6 \times 13 = 98$d., or 8s. 2d. per 1000 cubic feet, we should not have mentioned Mr. Silcock's statement but for the conclusion he bases upon it that "three years since electricity cost the consumer more than an equivalent of gas at 7s. per 1000 cubic feet. The reduction in the price of gas from its introduction was not by any means so rapid as that of electric lighting;" and a further great reduction is to be expected in the near future. We ask what justification Mr. Silcock can offer for this statement. If he is quoting from a more generally accepted authority, who is it? If it is his own calculation, where are the figures and facts? Until these objections are satisfactorily answered, we must decline to accept the statement in question as anything more than one of those vague assertions respecting the "progress of the art of electric lighting" which are so much more easily made than proved, that by common consent they are never taken notice of by serious students. The truth rather is that nothing material has been done in electrical engineering for the past three years to materially affect the cost of supplying the incandescent lamp. Consumers who accept such plausible statements as those of Mr. Silcock respecting the comparative cost of electric and gas lighting, will be grievously disappointed when their bills come in; for there can be no reasonable doubt that at the price at which the newly-fledged electric lighting companies propose to supply their commodity in London districts it will be from two-and-a-half to three times as costly as average London gas.

The opposition to the London Electric Lighting Orders Confirmation Bills on the part of The Gaslight and Coke Company, which was mentioned in this column last week, was settled on Friday by an agreement between the Board of Trade, the promoters, and the Gas Company which was made of general application. It was wholly concerned with the protection of mains, &c.; and The Gaslight and Coke Company deserve the thanks of the gas interest for their public-spirited action in this matter.

IN the second note to Mr. C. J. Hanssen's paper on "Reform in Pyrological Terms and Calculations," on p. 122 of the last number of the JOURNAL, the bottom line should have stood thus:

$$3 \text{ V.U. carb. acid} @ \frac{55}{28} \text{ G.U.} = 5\frac{25}{28} \text{ G.U.}$$

THE appeal in the case of *Cooke, Sons, and Company v. The New River Company* was argued in the House of Lords last Thursday, before Lords Herschell, Fitzgerald, and Macnaghten, and judgment was deferred. A report of the arguments in the case is in type, but is unavoidably held over.

GAS ENGINEERING OF THE PRESENT.

THE present appears to be a distinctly quiet time for British Gas Engineering; no particularly "burning questions" being actually under discussion. There are several points of gas engineering practice in an unsettled state; but there is nothing like an active controversy respecting any of them. We refer now to the Claus process of gas purification on trial at Belfast; the process of purification in dry boxes by the addition of oxygen, as adopted at Ramsgate; and the question of dispensing with, or greatly modifying the guide-framing of gasholders. As to the problem of continuous carbonization, an interesting attempt at its solution is in progress at Ludlow; but this is emphatically one of the questions which, like the poor, are always with us. These are in reality the only technical subjects that offer for discussion among gas engineers; and when it is remembered how warm debate has been over such questions as generator firing, the existing mildness, not to say dulness, of gas engineering controversy appears very noticeable. It would not be correct to say that there is no discussion of these current topics because no interest is taken in them; for we know that many gas engineers up and down the country are patiently awaiting the settlement of the points yet undetermined in all these new departures. It seems to be generally understood, however, that there is no occasion for hurry; still less for impatient criticism. Gas manufacture is not an art that needs any new discovery for its successful conduct, as electric lighting was when Edison sent his representative all over the East for a satisfactory kind of bamboo fibre for making into filaments for his lamps. Gas-works can wait for the issue of the Belfast and Ramsgate experiments; for there is plenty of time in which to change the system of purification that has not been fundamentally altered since the dry box supplanted the wet-lime tank. Similarly, there will be plenty of gasholders left to build long after Mr. Gadd and Mr. Pease shall have proved, or failed in demonstrating, the feasibility of their respective devices for doing away with gasholder columns. Controversy would neither hasten nor retard these events; and therefore they may reasonably be allowed to take their course quietly and naturally. We mention the subject now, in order that it should not be imagined that there is nothing doing by way of innovation in gas engineering, merely because there is little or no disturbance of the surface.

In the department of the retort-house, the chief novelty that bears mention is the Dinsmore process, which seems to be gaining a little head in Lancashire, although an answer is still lacking to the questions that have been publicly put to the inventor and his partizans with the view to settling the elements of his advertised results. In default of this information, we are not prepared to abandon the position of reserve which we have all along taken up respecting the claimed merits of the process. Time, which tries all things, will settle the matter in due course; and so we are willing to wait for our information, and can certainly afford to do so if the Dinsmore people can afford to defer their justification. While upon the subject of retort-house management, it may be worth notice how completely the so-called "anti-dip" craze of only a few years back has died out. We call it a craze, because it amounted to this at one time, when nearly every gas manager in the land had a try at the suppression of the seal in the hydraulic main by the aid of an apparatus of his own, or one that was recommended by the makers as capable of working wonders. Whither have all these ingenious devices gone? Not even the scrap-heap now confesses their presence. A few may yet linger in some places; but, as a rule, the "sweet simplicity" of the hydraulic seal has resumed its sway. Hydraulic mains are made in shorter sections than they used to be, and are flushed out, and the heavy tar separated, with a care that was unheard of a few years ago; but there change has stopped.

At the recent meeting of The Gas Institute, Mr. G. Shepard Page, of New York, asked if anybody present knew anything about the use of inclined retorts, for the facilitation of automatic stoking; and he failed to get an answer. Mr. Page is understood to be interested in a French device of this kind; but there is nothing new in the idea. Mr. W. T. Carpenter, of Sheerness, read a paper before the British Association of Gas Managers in 1878 upon a setting of inclined retorts which attracted much favourable comment at the time; but nothing came of it. This is the way with new departures that after a shorter or longer course, according to circumstances, come to a "dead end." The student of the subject who finds their records in old transactions has no means of knowing why they came to nought; and so he is apt to waste time and effort in resuscitating an idea that has perhaps been abandoned, if he could only learn as much, on account of some insurmountable defect. On the other hand, the old scheme may contain within itself the germ of real utility, lost for the time through some detail imperfection which later science is able to remove. Who can say? As there is nothing new under the sun, so there is nothing exactly similar in every respect to anything else. It is in the differences that improvement may be looked for.

Looking through an old volume of the JOURNAL is like going into a geological museum, for the light which the past sheds upon the present. We constantly come upon fossils which once represented energetic life, giving no indication of approaching extinction of the individual and type. In time the organism ceases to correspond with its environment, and it dies out. Perhaps we may discern in it a progenitor of an extant type; or it may represent such a failure as must needs have come to a complete stop. Nature and art work in precisely the same way. There is no Royal road to success for either. Only by incessant trial and

effort, involving prodigious waste, can the successful type be established. The existing system of gas manufacture represents a great number of essays aimed at altering it. There is not a feature of a modern retort-house, commonplace as it is, that does not remain because of some special fitness of its own. Mr. Findlay, who has recently written a book upon the management of the London and North-Western Railway, declares in it that there is nothing on the line, from a locomotive down to the shape of a porter's cap, that is not the result of experience. So it most certainly is in a gas-works. Take retorts for example—they have been made of great varieties of section, size, length, thickness, material, method of manufacture, use, and working. There is no authoritative statement that gas-retorts shall be as they are, set as they are, or worked as they are worked. It is all the effect of experience educed from infinite experiment. As it is with the retorts, so it is with their fittings. Ascension-pipes have been tried long and short, large and small, single, multiplex, heated, cooled, thin, thick—everything has been done for their improvement; and the result is the ascension-pipe as we see it to-day. It is the shallowest fallacy to imagine that because a manufacturing process or a tool retains its character or form for an indeterminate period, therefore it argues stupidity and lack of inventiveness on the part of its users. If we could take account of the fruitless efforts that may have been made to improve the system or the tool, we should entertain a different opinion. Nature tells us the same story in regard to organisms and types. The truth appears to be that there are certain methods and appliances in industry and nature which cannot be improved. These may exist alongside of other systems and tools which are susceptible of improvement, but it does not follow that the unimprovable ones are to be despied as inferior on this account, Nature has produced the horse, the dog, and the ox by a prolonged improvement upon the hipparion and other extinct imperfect types. Man has carried the process still farther for his own purposes, having found these types peculiarly susceptible to improvement. Yet the same man who prides himself upon his improved breed of cattle, his improved vegetables, and other ameliorated comestibles, will confess the unalterable oyster and even the cockle, which have remained unchanged through immensities of geological time, to be equally good in their way. So while we admire the self-binding reaper, on account of its adaptation to modern requirements, we do not despise the sickle; nor does the massive crane cause us to look down upon that triumph of early mechanical genius, the wheelbarrow. Wherefore, when electricians allege the variety and ingenuity of their own incessant modifications of plant as a proof of the superior scientific character of their art when compared with the settled processes of gas making, we can say truthfully we went through that stage long ago.

Do we regard the established methods of gas manufacture as perfect, then? By no means, or it would be idle to point to projects for their improvement actually in course of development. What we do say, however, is that the settled character of most of the gas engineering practice of the day is by no means due to unintelligent observance of routine, although this, of course, may be alleged against many practitioners whose wisdom consists in despising innovators. These worthy gentlemen make few mistakes; but it is a wise saying that the man who makes no mistakes never makes anything else. There is a certain order of mind which when it sees a certain apparatus used in a horizontal position desires to ascertain the effect of fixing it vertically, and *vice versâ*. If a brick is ordinarily laid on its flat, this innovating person wants to set it on edge. If a pipe for any specific purpose is of certain dimensions, the victim of this spirit wants to know why it could not be larger or smaller, or longer or shorter, as the case may be. We do not hesitate to say that there is very little scope in a modern gas-works for such a "contrarious" mind. Nothing is gained by the indulgence of a spirit of difference from routine for difference' sake. All these matters have been settled by that much-questioned quality "the wisdom of our ancestors." Sooner or later all human arts fall under the domination of use and wont, which can only be broken in upon for some demonstrable good purpose. The newest arts and sciences, such as telephony and incandescent electric lighting, speedily settle into broad lines of accepted practice, the reasons for which are not always obvious to the generations succeeding those in which they were developed and adopted. Thus routine follows innovation—the agriculturist treading on the heels of the settler, and the mining engineer supplanting the prospector. Of course, there is a drawback to this process; but, on the other hand, no human art or industry attains its highest utility until routine has facilitated operations, reduced waste, and left the way clear for the attack upon those higher difficulties and obstacles which bound all settled occupations, and afford scope and stimulus to the most adventurous spirits among those who, while respecting the work of their predecessors, do not concede that they set the last bounds to enterprise.

In an article in the *Chemiker Zeitung* on "Reasons why Iron Water-Mains Corrode if not Tarred," Herr G. Weissmann states that even if these mains contain only traces of sulphur and phosphorus, they are readily corroded if not tarred. This is especially the case if the soil in which they lie is rich in organic substances such as humic acid, contains nitrates and ammonia compounds, or is saturated with water containing carbonic acid. Access of air is equally detrimental. It is a well-known fact that brine has not corroding action on iron tubes which are tarred, so long as the tubes are kept full. This applies equally to pure water.

THE PAST YEAR'S WORK UNDER THE ALKALI ACT.

The Twenty-fifth Annual Report of the Chief Inspector under the Alkali, &c., Works Regulation Act, 1881 (Mr. A. E. Fletcher), was issued last week: It contains an account of the labours of the Chief Inspector and his colleagues during the past year; and as these include the supervision of those gas-works in which the manufacture of sulphate of ammonia is carried on, we give an abstract of such parts of the report as appear to be of most interest to our readers.

The number of works in England and Ireland registered under the Act at the close of 1888 was 926. In addition to these, 131 were registered in Scotland; giving 1057 as the total number of works in the United Kingdom. At the close of 1887 the total was 1066. The works in Scotland have decreased by eight, and those in Ireland by two; in England, however, there has been an increase of one. On the whole, therefore, there is a drop of nine. Of the 926 works registered at the close of last year, only 119 were alkali works proper; the rest being factories in which various operations are carried on. Gas liquor was treated in 28, and sulphate and muriate of ammonia produced in 320 works in 1888, as compared with 26 and 311 works in 1887. The works are visited by the inspectors about once a month; but, of course, no previous notice is given. The total number of visits paid last year was 5101; the number of tests made being 4212. With regard to the deleterious gases which pass into the air from the various operations, the Chief Inspector states that a slight improvement has to be recorded for the past, as compared with the preceding year. The average amount of gases escaping in each district under his supervision is, as in previous reports, given in tabular form. The acid gases (stated as SO_3, and expressed in grains per cubic foot) issuing from sulphuric acid chambers averaged 1·32 in 1888, 1·50 in 1887, and 1·40 in 1886. The limit allowed in the Act is 4 grains per cubic foot of air or inert gas. Proceedings were taken against several companies and firms for non-compliance with the Act; and one gas-supplying corporation was fined £10 for not registering their plant for the manufacture of sulphate of ammonia. Mr. Fletcher explains that the objects of the inspectors' visits is not to collect materials on which to base a prosecution, but rather to assist the manufacturer in keeping up with the requirements of the Act; bearing in mind its main provision, that "the best practicable means shall be adopted for preventing the discharge into the atmosphere of all noxious or offensive gases." It has been found that one of the best ways of giving their help is by inducing the manufacturer to maintain a constant system of testing the effluent gases from his various apparatus, and to employ the most skilled assistance he can obtain for the supervision of his work. Of the 131 works registered in Scotland, only 16 were alkali works. The number of visits paid to them was 467, and 227 chemical examinations of the escaping gases were made. There were no prosecutions under the Act in Scotland.

Passing to the section of the report dealing with alkali works, we find some interesting observations, supplementing those made by the Chief Inspector in his report for 1887 (an abstract of which appeared in the Journal for July 3, 1888), on the struggle for supremacy of the Leblanc and ammonia-soda processes for the production of soda-ash. The older process of the French chemist had already lost much ground before its rapidly advancing rival, when it received an unexpected accession of strength in the shape of the process introduced by Mr. A. M. Chance, for the recovery of the previously lost sulphur contained in the "waste," by the aid of the ingenious kiln devised by Mr. C. F. Claus, which was described and illustrated in the Journal for Jan. 8 last (p. 66). At present about 90 per cent. of the sulphur in the tank waste is recovered as sulphuretted hydrogen; and from 80 to 85 per cent. of the sulphur contained in this may be regained in the solid form, or 98 to 99 per cent. as sulphuric acid. The sulphur thus obtained is of the purest quality, and realizes a high price in the market. The new process for the manufacture of soda proposed by Messrs. Parnell and Simpson, and mentioned in Mr. Fletcher's previous report, is still being elaborated by them. Like that of Mr. Chance, it achieves the recovery of the sulphur from the tank waste. In addition to these processes, there is another, by Mr. F. Gossage, of Widnes, whereby the manufacture of soda may be carried on without the formation of any tank waste whatever. Sulphate of soda, formed by the decomposition of salt by sulphuric acid, as in the Leblanc process, is mixed with coal and heated in a furnace, and so reduced to sulphide of sodium. The mixture of sulphide and salt is dissolved in water and exposed to the action of carbonic acid, when sulphuretted hydrogen is given off, to be dealt with as in the Chance and the Parnell and Simpson processes for the production of sulphur or sulphuric acid, while bicarbonate of soda is formed, and separates by precipitation from the solution of unde composed common salt. Thus, says Mr. Fletcher, a threefold promise is held out that the days of alkali waste are numbered.

From the portion of the report relating to sulphate of ammonia we obtain some valuable statistics. The principal source of ammonia is, of course, the liquor produced in gas-works. Next in importance comes the distillation of shale, the main products of which are petroleum oils and paraffin. A third source is found in the gases from iron-smelting furnaces, formerly allowed to burn in open flame, but now in most cases utilized as heating agents—the ammonia being first separated. A fifth source is the distillation of bones in the manufacture of animal charcoal; but the quantity produced is exceedingly small as compared with that arising from the processes previously named. The value of the ammonia saved by the utilization of the waste products in these

manufactures is reckoned at no less than £1,473,420 a year, taking the price of sulphate at £12 a ton. The following figures show the production of ammonia last year from the sources above-mentioned; the trifling amount resulting from bone distillation being included in the first item:—Gas-works, 92,896 tons; iron-works, 5280 tons; shale-works, 22,072 tons; and coke and carbonizing works, 2537 tons—total, 122,785 tons, against 113,896 tons in 1887, and 106,610 tons in 1886. Taking the gas-works production alone, there was last year an increase of 7874 tons as compared with 1887, and of 10,416 tons as compared with 1886. In Scotland there were 52 sulphate of ammonia works in operation at the close of 1888; the source of ammonia in 24 of them being gas-works liquor. The total production of sulphate was 36,831 tons, having a commercial value, at the above-mentioned figure, of £441,972. These figures show generally that the amount of ammonia saved is continuously increasing; and Mr. Fletcher is of opinion that the working of the Alkali Act has contributed to some extent to this result, by stimulating the managers of the small gas-works distributed throughout the country to a more systematic treatment of their liquor. In the preparation of sulphate, the contact of the ammoniacal compounds with the sulphuric acid causes the evolution of large quantities of sulphuretted hydrogen, which, of course, have to be effectually prevented from escaping into the atmosphere. Various methods of dealing with this gas are resorted to; absorption by hydrated peroxide of iron being the one usually employed in gas-works. In a tabular statement, Mr. Fletcher gives particulars of the arrangements adopted in 117 cases where oxide purifiers are used for the decomposition of the sulphuretted hydrogen. These particulars embrace the quantity of oxide made per 24 hours, the process adopted (intermittent or continuous), the superficial area of the purifier, the depth and the number of layers of oxide, the number of cubic feet of oxide per hundredweight of salt produced in 24 hours, the length of time the oxide remains active and the process of re-oxidation, the apparatus used for condensing steam from sulphuretted hydrogen, and remarks as to the efficiency or otherwise of the apparatus. The statement shows that a wide divergence of opinion exists as to the best proportion to be observed between the parts of the apparatus and the size of the plant needed for the work to be done. But as the use of oxide purifiers, even of the varied size and form described, is attended with success, Mr. Fletcher thinks there is little ground for any one to object to them. He urges one point of importance with regard to their use—viz., that they should in all cases be open to the air, and not closed and connected with a chimney, for the reason that when a purifier is open all who pass it can at once perceive any small escape of sulphuretted hydrogen, and the evil is likely to be promptly corrected. If, however, the escaping gas is led off to a chimney, the evil may go on for a long time unperceived, until it has become one of considerable magnitude. In nearly all cases the oxide is employed dry or slightly damp; but Mr. G. E. Davis has introduced the use of oxide suspended in water. This, it is stated, answers well for arresting and decomposing the sulphuretted hydrogen; but a steam-jet or other agent is necessary to drive the gases into and through the liquid. The plan has the advantage that when air is driven in with the gases, oxidation is kept up without danger of overheating.

The Chief Inspector next deals at some length with the subject of the emission of black coal smoke from factory chimneys, the interest attaching to which has, he tells us, by no means abated. There exists on the part of the public a growing feeling that something should be done to diminish the great evils arising from this source. Especially has this been shown in Manchester, Bolton, and some of the principal smoke-producing districts. The mortality of the great Lancashire city has lately increased; and the inhabitants have not unnaturally considered that the dark panoply of smoke under and in which they live contributes largely to the evil. Mr. Fletcher gives the results of the analyses of samples of chimney gases from 36 hand-fired, and 16 mechanically-fed furnaces employed in works in various parts of the Newcastle and Lancashire districts. These analyses (which were made with the help of the gas apparatus devised by Mr. Stead, of Middlesbrough) show that the combustion of the coal used is generally carried on roughly and without a due regard to economy, in that the proportion between the fuel used and the air supplied vary enormously, and that but imperfect use is made of the air which is present. For the remedy of this evil Mr. Fletcher looks to an extended employment of gaseous fuel. He notices the various appliances which have been devised for the purpose of producing this fuel; and recommends the holding of a competitive exhibition at which, under equal conditions as to fuel, water, and class of boiler, an accurate comparison could be made with the view of determining which are the best forms of furnace and systems of fuel combustion for obtaining maximum efficiency and avoiding the nuisance of black smoke. This, he says, becomes the more necessary in view of the fact that, as we are told, our coal supplies are waning, and that therefore a more economical use of the remainder should be practised. As one of the "avenues of hope" for the future avoidance of black smoke, he specially mentions the use of the thermo-motor invented by Mr. Hargreaves, of which a description appeared in the JOURNAL for Dec. 4 last year; and it may be added that every kind of gas-engine, by dispensing with boilers and furnaces, contributes very materially to the attainment of this much-desired end.

Following the Chief Inspector's report are the reports of the District Inspectors, which deal fully with the works comprised in their areas. These will be noticed next week.

Communicated Article.

THE PARLIAMENTARY RETURN AS TO THE LONDON WATER COMPANIES.

By STATISTICS.

In a previous issue of the JOURNAL (Vol. LIII., p. 152) you have alluded to certain returns furnished to the House of Commons, on the motion of Mr. J. F. B. Firth, by the London Water Companies; and I notice that other particulars asked for by this gentleman have been presented. From the replies already made by the Companies to the questions put to them, it is apparent to the most casual observer that the question of waste has been ignored; the answers in two cases being obviously inserted merely to gratify the curiosity of the gentleman who moved for the returns. Mr. Firth seeks for an estimate of the daily waste in gallons—waste being understood to mean that portion of the water supply which is not consumed for domestic requirements, trade purposes, street watering, gardens, &c., but arises from defective mains or service pipes, inefficient plumbing, &c.

What manner of use are these statistics, or rather rough approximations, to Mr. Firth, now that he has them? It appears to me that the question of waste does not affect the consumer in the slightest degree so long as his personal property is unaffected. If it did, it is certain that he would have no waste on his premises. It is evident that such statistics can have no bearing whatever on the improvement of the water supply to the Metropolis, and should never have been desired or supplied. The object sought is simply to provide materials for an attack on the London Water Companies; and it is quite clear that the authority of Parliament should not be employed for such purposes. The information drawn from the water-works authorities by a most unfair proceeding, will be used to the detriment of the Companies, as were Mr. Firth's former returns, which were proved to be erroneous by the Secretary of the Share and Loan Department of the Stock Exchange.* Of what value can such statistics prove, if the whole of the information is on a par with the supposed waste, as supplied by two Companies out of the eight interrogated? Conclusions based on such erroneous data, and manipulated by M.P.'s not educated as water-works engineers, can never lead to correct or useful results. The latest case dealing with this subject, and noted in the JOURNAL, occurred at Plymouth, where the Surveyor rightly objected to the method on which the waste-meter advocates made their calculations; and adopted other measures for the prevention of waste which have proved eminently successful, as in Manchester and other large towns.

In Parliamentary Paper No. 397 of session 1882, will be found the following answers returned to the same question from the several places named:—Birmingham: "The question cannot be satisfactorily answered." Bradford: "The quantity is unknown; but is estimated as amounting to 15 to 20 per cent." Leeds: "About 1,500,000 gallons per day." Liverpool: "It is impossible to answer this question usefully without a definition of waste." Manchester: "There is little or no waste in the distribution of the water." If the London Water Companies were to adopt the same measures as are now in operation in Manchester, their reply would be as satisfactory. That there is waste, no one disputes. This waste principally occurs at the water closets; and it is evident that the law must be enforced to compel owners of property to put their fittings in order, and entirely cut off all closets supplied directly from the mains.

There are circumstances and conditions so varying in every water company, and so many methods of arriving at results, that unless the same system of computing waste is adopted with all the companies, the statistics may be made to convey most misleading conclusions and erroneous ideas. With such a large number of inhabitants, it is most difficult to state with anything like accuracy what is used and what is wasted. It is usual to compare the statistics of numerous towns; but no account is taken of whether the town may be a large manufacturing centre or a modern seaside resort, or whether all the closets are supplied entirely on the water-carrier system, or what proportion of them. Is the same quantity of water per head consumed by the inhabitants of the East-end of London as by those at the West-end? And where are the meters for trade purposes mostly to be found? London is not now as it was even ten years since. The great suburban population, with its baths and garden supplies, fountains, &c., and the constant instead of the intermittent service, formerly in vogue in London, have enormously increased the supply; and every increase is attended by its proportion of waste. It is usual to take the Water Examiner's official returns of the number of houses supplied, and the quantity of water sent out, and allowing (say) eight persons to a house, the sum total is the quantity of water consumed per head. How is the calculation made for horses, cattle, and trade purposes, road watering, fountains, public washhouses, baths, gardens, and other uses? A small proportion of such supplies are metered. Each Company has its own method of calculation; and probably instead of the 30 gallons per head, some of the Companies are supplying only 20 gallons. Therefore it is essential that the information should be obtained from the Engineers, who are conversant with the facts, and an explanation given as to the method of arriving at the result. General Scott's business is that of a Water Examiner, who is from time to time to examine the water supplied by any London Company, in order to ascertain whether

* See JOURNAL, Vol. XLV., pp. 737, 786, 829.

or not they have complied with the requirements of section 4 of the Metropolis Water Act, 1852, which enacts that "every company shall effectually filter all water supplied by them within the Metropolis for domestic use, before the same shall pass into the pipes for distribution." There is nothing said here about supplying information as to waste.

The information asked for by Mr. Firth cannot be used in the interests of the Water Companies; and it may be employed to their detriment. If the statistics given were analyzed by competent water-works engineers, who have devoted their lives to this branch of engineering, some good and useful purpose might be educed for the benefit of the purveyor; but no benefit can accrue to the consumer, for he has to bear the expense of supplying the figures for the sole advantage of the person asking for them. It is surprising that members of Parliament should be so easily led to acquiesce in spending the people's money in so useless a manner. No doubt there are large quantities of water pumped to no good purpose; but the enormous waste that is talked about by the inventors of special appliances for its prevention would not exist if the Companies valued the few thousands of gallons of water which they allow to waste, above what it would cost to develop an elaborate system of detection by automatic machines, or institute even the less expensive system of night inspection, which, if carried out in its entirety, in a disciplined business fashion, is quite equal to any of the many meter or other systems now before the public. Experience has taught the London Water Companies that it is far more expensive to work an elaborate system of detecting waste than to pump an extra quantity of water; and the sanitary condition of London has not suffered thereby.

The difference in the consumption of water per head of the population where efficient and non-efficient regulations are carried out, averages from 20 gallons in the former to 80 gallons and upwards in the latter. If the London Companies were not so lax in enforcing the rules they already have—though less rigid than those possessed by many of the Provincial Companies—a great saving might be effected. At the same time the public must be taught to feel that the Water Companies have rights and laws as well as other companies incorporated by Act of Parliament. Of course, it is quite necessary that the waste should be stopped by all legitimate means in some towns; but if a water company can pump water at a cheaper rate than they can carry out any of the many methods of inspection, then it is to their advantage to allow the water to waste, rather than go to great expense simply to satisfy the newspaper public, and certain agitating Members of Parliament. What harm can water which is being wasted do to the public? It is they themselves who not only neglect to check the useless running away of water from their own private fittings, but encourage waste in every form, and obstruct the inspector in his duties of detection. Admitting, however, that there is waste, and that it is wise to reduce it to a minimum, its suppression must not be supposed to be a curtailment of the use of water, or the advocacy of a niggardly service; but the supply of water for all legitimate purposes in abundance, and keeping an efficient high pressure for extinguishing fires and the safety of property and so on. With such numerous schemes and appliances as there are at hand, it cannot be said that the detection of waste baffles the engineer. It is the most simple matter he has to deal with, if only the system of night inspection is carried out in its integrity. Some companies wait until there is a difficulty in supplying the houses in a certain district before they think of starting a disciplined night inspection; but others have adopted various means and systems for the detection of waste, some of which are very costly, in my opinion, and mostly unnecessary.

The Directors of The Gaslight and Coke Company recommend a dividend for the past half year at the rate of 13¾ per cent. per annum, carrying forward £285,956.

The dividend of the Newcastle and Gateshead Gas Company for the past year is to be raised to £4 12s. 6d. per cent. The Directors have elected Mr. Hepworth, of Newcastle, to fill the vacancy at the Board caused by the recent death of Mr. Alderman Plummer.

Mr. E. T. Atkinson, who has just been appointed, out of 201 applicants, to the post of Mechanical Engineer to the London County Council, has been for many years connected with a firm of engineers at Hyde. He is an Alderman of Stalybridge; and as Chairman of the Gas Committee has done good service to the town.

In a little *brochure* of 32 pages, which has lately been issued by Messrs. Simpkin, Marshall, and Co., entitled "Electric Light for the Million," Mr. A. F. Guy, Assoc. M. Inst. Elec. Eng., professes to give the uninitiated concise practical instruction on electric lighting and its cost. The author admits that the outlay for an installation of electric lighting is heavy; but he thinks this should be regarded as a luxury—like pictures or books. He endeavours, however, to show that the light itself is, under favourable conditions, far cheaper than gas. He hopes that his little book may induce gas companies to become electric light suppliers, convert their works into central stations, and their customers into connections for the furtherance of electrical distribution; thereby making their imaginary enemy and rival their best friend. The book being written for the "million," the contents are arranged to meet popular requirements, and do not call for detailed notice in these columns.

Technical Record.

SOCIÉTÉ TECHNIQUE DU GAZ EN FRANCE.

The Papers at the Annual Congress.

In the Journal for the 11th ult. (p. 1085), we published a list of the papers to be presented at the Congress of the Société Technique du Gaz en France, which was opened that day in the Gas Pavilion at the Paris Exhibition. We are now in a position, by the aid of abstracts which have appeared in the *Journal des Usines à Gaz*, to give our readers an idea of the scope of the various communications.

As already stated, there were two prize papers—one on the "Radiation of Heat, Considered in its Applications to Lighting and Heating," by M. Guéguen; the other on "Ventilation by Gas," the joint production of MM. Coindet and Marchal. M. Guéguen, in his paper, has studied the subject of the radiation of heat which accompanies the combustion of gas in various kinds of lighting appliances. Having recapitulated the conclusions of previous investigators, he describes the apparatus employed by him in his experiments. Pending the fuller notice of the paper which we hope to give when it appears in its complete form in the publication over which its author exercises editorial control, it will be sufficient now to state the results obtained. M. Guéguen finds that in batswing burners the amount of heat radiated per 100 litres (3·53 cubic feet) of gas is, on an average, 100 calories, or, in round numbers, one-fifth of the total heat due to the combustion of the gas. Burners surrounded by glass chimneys throw off, on an average, 140 heat-units, in the form of radiated heat, per 100 litres of gas consumed, when the rate of delivery of the burner is 180 litres (6·35 cubic feet) per hour, and 175 units with a delivery of 250 litres (8·82 cubic feet) per hour. The amount of heat radiated with these burners therefore rises to more than one-third of the total quantity produced by the combustion of the gas; while with the old forms of burners, made entirely of metal, and used with rather high chimneys, it would no doubt exceed one-half. These figures, which at first sight are somewhat disquieting, led the author to endeavour to find some means of decreasing the influence of calorific radiations. He considers successively the use of screens formed of plates of clear or ground glass (with or without the interposition of a stratum of air or water), and others of frosted glass; and he gives the preference to glass which has been coated with a thin layer of white gelatine. The conclusion to be drawn from M. Guéguen's researches appears to be that burner and lamp makers ought to become inspired with a desire to reduce to the minimum the quantity of heat radiated from both ordinary and high-power gas-burners. With regard to the *mémoire* of MM. Coindet and Marchal, the aim of the authors appears to have been to describe in detail various arrangements carried out at Rouen for the ventilation of warehouses and apartments in conjunction with gas lighting. After setting forth the general principles of ventilation, the authors explain shortly the methods followed by them to determine the quantity of carbonic acid and aqueous vapour in the air, as well as its temperature and the speed of currents. They then give a number of tables, accompanied by plates, containing the results of their experiments. In the first, they show the effect, on the air of an unventilated apartment, of lighting by ordinary batswing, Argand, and recuperative burners. In the next table, the results are given of similar experiments carried out in an apartment where there was natural ventilation. Other tables contain observations relative to ventilation by means of lighting appliances with various accessory arrangements used in different places; one showing what goes on in an unventilated school-room lighted by gas. The authors, unfortunately, do not formulate any practical conclusions as the result of their investigations; confining themselves to the remark that gas is a very wonderful hygienic agent, inasmuch as it is capable of expelling, from apartments where it is employed as a lighting medium, deleterious products which, if not removed, would be injurious to occupants of such apartments.

Coming now to the ordinary papers, the first to be noticed is one by M. Lencauchez, in which the author takes a historical survey of the construction of retort-furnaces from the commencement of the gas industry, and endeavours to show that during the past twenty years there has been really no new discovery in connection with these furnaces on the whole, but merely improvements in details. It will be interesting to see, when the full text of the paper is published, how far this opinion is justified by the author's collected facts. The subject of furnaces was also dealt with by M. Lauras, though from rather a different standpoint. He described a new double furnace erected at the Rouen Gas-Works, in which the principal object sought was extreme simplicity combined with great solidity; the amount of recuperation desired being only such as would be compatible with this condition of things. With a setting of eight retorts, 8000 kilos (7 tons 5 cwt.) of English coal were carbonized in 24 hours; the consumption of coke being rather less than 11 bushels per ton. The Company are so satisfied with the working of this setting, that they are about to put up three double ovens of eight retorts on the same plan. Bearing upon retorts was a paper by M. Laurain, who described a new system of sealing the lids without luting. The soundness of the joint is obtained by means of a layer of asbestos placed in a groove in the head of the retort. The arrangement has been in operation during the past six months in the Troyes Gas-Works, to the entire satisfaction of its designer. Before leaving the retort-house, brief mention should be made of the system of tar firing

described in the paper of M. Moirand. The author's arrangement allows of a change from coke to tar, and *vice versâ*, at will. As the furnaces at the Gènes Gas-Works have been for several years fitted up with this alternative system of firing, there is nothing particularly novel in the plan. M. Moirand's communication is none the less interesting on this account, as he gives statistics as to the consumption of various fuels—tar, coke, and breeze—to which we may have an opportunity of referring on some future occasion.

There were several papers dealing with the condensing and purifying arrangements of gas-works. M. Melon described some condensing-tanks which are so contrived as to allow of the separation of the ammoniacal liquor and the tar, and of the pumping of the latter by means of a draw-off well which may be heated by a steam-pipe. A new kind of scrubber—designed on what is claimed to be a "rational" plan—was brought under the notice of the members by M. Chevalet. The appliance consists of a cylinder or hollow column, the interior of which is fitted with cast-iron channels or gutters, placed 10 or 12 inches apart, and perforated with a large number of holes. The space between these gutters, which support each other, is filled with some material presenting a large surface, such as wood shavings or coke. When water is run from the top to the bottom of the scrubber, the gutters are filled, and the material becomes saturated. But should the flow of water by any accident cease, the gas, in passing upward, still encounters the moistened surfaces of the coke or the shavings, on which it deposits its soluble properties. The author claims that by means of his scrubber he can obtain liquor of 7° to 8° Beaumé (say, 1·05 sp. gr.). The washing and purification of gas was dealt with by M. Alavoine. In the Beauvais Gas-Works, of which M. Alavoine has charge, the gas issuing from the retorts passes first of all through a hydraulic main fitted with perforated plates on the system described some time ago in the JOURNAL, next through a Chevalet apparatus, then through a Pelouze and Audouin condenser, and finally (after passing a Körting exhauster) through an upright condenser and a scrubber. It is washed with ammoniacal liquor—first, in the proportion of about 156 gallons per ton of coal, in the hydraulic main; next, at the rate of about 66 gallons per ton, in the Chevalet apparatus; and finally, and much more lightly, in the scrubber. M. Alavoine finds that the proportions of impurities taken out of the gas before its arrival at the purifiers are as follows :—

	Ammonia. Per Cent.	Sulph. Hyd. Per Cent.	Carb. Acid. Per Cent.
Hydraulic main . . .	65·93	43·40	13·12
Chevalet apparatus. .	20·88	15·51	4·55
Pelouze ,, . .	4·04	0·54	—
Condenser and scrubber	2·80	5·42	10·08
Total . . .	93·65	64·87	27·75

These results are stated to be due to the use of the ammoniacal liquor, which takes out a great deal of sulphuretted hydrogen but little carbonic acid, and to the washing of the gas in the Chevalet apparatus and the scrubber. Another paper on the subject of the purification of gas, but dealing with the matter rather from the standpoint of the chemist than that of the gas manufacturer, was presented by MM. Aguitton and Debenoit. The object of the authors was to study the reactions which take place in the purifying material in proportion to the quantity of ammonia remaining in the gas after passing the scrubbers, and to ascertain how it is that the ferrocyanides, sulphocyanides, Prussian blue, and free sulphur, are met with at different ages of the revivified material. According to the authors' conclusions, the absence of ammonia from the gas renders inactive a portion of the oxide of iron by converting it into Prussian blue. In the case of Laming mixture, it is possible for the stuff to become inactive if the rate of passage of the gas is sufficiently high, and the quantity of oxide below the proportion indicated in the formula for its preparation. In this case, it would be necessary to force into the material the required quantity of sulphate or oxide of iron in order to ensure good purification after two or three revivifications.

We have now to notice the papers dealing with the distribution of gas. First to merit attention was one by M. Avril, describing the working of a gasholder station at Bordeaux, and the loss of pressure observed at various points on the mains. There are at Bordeaux about 8500 yards of pipes of large diameter from which there is not a single branch. This condition of things afforded an excellent opportunity for studying the loss of pressure sustained by the gas in its travel, and for verifying the formulæ on this point furnished by MM. Arson and Monnier. M. Avril summarized, in a series of tables and diagrams, the results of a number of experiments carried out with extraordinary pressures—13 to 26 inches of water. He found that M. Arson's formula approached nearer than that of M. Monnier to the results of his observations; and also that it is necessary, in practice, to apply some very important corrections to the figures furnished by theory. Bearing upon the subject of the loss of pressure is the question of leakage; and therefore M. Deleury did good service in describing his "dry isolator" for detecting escapes. The appliance may be employed as a substitute for the "syphon isolator" of M. Gibaut, which was described in the JOURNAL some time ago. The new form of isolator possesses the double advantage of being inexpensive in construction and at the same time applicable in conjunction with existing syphon arrangements on the mains. Another leak-detector, devised by M. Cruvellier, was described by M. Alavoine, who stated that excellent results had been obtained with it at Beauvais. Other gentlemen, however, considered the process (which consists in the employment of two preparations of chloride of palladium—one for large, the other for slight escapes) complicated and uncertain; the method introduced and described at a previous meeting by M. Schauffler, which is based on the use of the same reagent, being regarded as more simple by those who had had an opportunity of testing it. The leakage of gas being admitted, the next thing is to endeavour to account for it—a task which was undertaken by M. Delahaye. This gentleman considers leakage—or rather, as he prefers to call it, following the English plan, "unaccounted-for gas," — to be attributable to condensation, to errors in measurement at the consumers' meters, to excess of consumption by the public lamps, and to defects in the mains. The author, in his paper, examined at length the extent to which each of the above-named causes contributes to the total quantity of gas unaccounted for, taking Paris as an example; and he came to the conclusion that the loss of gas from a properly-laid and well-maintained network of mains amounts to only half of the total, and that the remainder must be put down to condensation and to faulty registration at the consumers' meters. The adoption of thoroughly trustworthy measuring instruments and the employment of regulators in the public lamps, appear to be the only means of minimizing the loss of gas resulting from two of the causes indicated by M. Delahaye. An allied subject to that discussed by M. Delahaye was brought forward by MM. Serment and Prat, who indicated the principal causes of the loss of electricity in connection with the supply of the electric light. One of these was, as in the case of gas, the imperfection of existing meters—instruments extremely delicate in construction, liable to frequent derangement, and recording results to a very small extent comparable with each other. An interesting account was given by M. Melon of the results of the first year's working of his system of gratuitous installations of gas at Lille. M. Melon described his plan at length in the paper on the best means of developing the consumption of gas read by him at last year's meeting. An objection was raised to his system, on the ground that losses might be incurred owing to some of the consumers not complying with the conditions laid down. The author replied to this objection by producing figures. Out of 443 consumers whose houses had been gratuitously fitted up during the year (representing 1525 burners), the loss was reduced to 12, belonging to four consumers—really less than 1 per cent. It would therefore be absurd to bring this forward in support of arguments against the introduction of M. Melon's system.

The remaining papers may be conveniently noticed together. M. Delahaye, in a communication on the subject of the possible profits to be derived from electric lighting undertakings, stated that, according to statistics relating to upwards of forty electric light companies in Massachusetts, the profits derivable from this industry are far below those realized in the business of gas supply —even to the extent of 2½ times less. Arc lighting is occasionally advantageous; but incandescent lighting does not return more than from 3 to 4 per cent. on the invested capital. Special interest attaches to this statement, from the fact that electric lighting in the United States must be considered to have passed its experimental stage. M. Delahaye also read a short note explanatory of a curve he had constructed to show graphically that, in the case of large companies whose share capital is all called up, and who have to raise money for extensions by the issue of bonds, when the price of gas has been brought down to a certain figure, further concessions to the consumers are not compensated by the resulting increased consumption. In constructing his curve, M. Delahaye took as a basis a total annual production of 300 million cubic metres of gas, with 5 per cent. unaccounted for, a net cost of 15c., and a selling price of 30c. per cubic metre. M. de Lachomette, in a short paper, supplementary to the one read by him last year, gave the meeting some practical indications as to the application of the process for the manufacture of sulphate of ammonia then described; and M. Melon, in another brief communication, advocated the use of soda in the place of lime in the treatment of ammoniacal liquor—specifying the conditions under which this substitution would be useful. M. Denayrouse made reference to the Clamond burner, which he stated had been so improved as to be able to rival its more fortunate competitors—notably the Welsbach light; and M. Serment described a safety burner furnished with a glycerine regulator so arranged as to automatically close the gas inlet in the case of a stoppage of the meter, and keep it closed until the burner tap had been turned. An arrangement for lighting and extinguishing all the public lamps in a town by means of regulators at the works was brought forward by MM. Grébel and Croc. A flash-light would necessarily be required in each lamp; and unless the lanterns were specially constructed to resist currents of air, the accidental extinction of the jet by a high wind would be a contingency extremely likely to arise, and interfere with the efficient working of the system. M. Lichtsfousse explained the construction of a transparent calorific screen devised by him, consisting of a layer of water spread over a plate of glass, having its edges upturned so as to retain the liquid, and suspended beneath the light at a distance varying according to the intensity of the latter, the diameter of the screen, and the width of the projected beam sought to be obtained. The question of the analysis of gas was discussed in great detail in the paper of M. Egraz; its photometrical examination was dealt with by M. Salanson, who studied the corrections necessary in order to render observations comparable with each other; and its use as a motive power was incidentally touched upon by M. Ravel, in a few verbal explanations offered by way of

comment on two reports, by M. Lenoir and M. Monnier, on the motor bearing his name.

It will be obvious that the foregoing abstracts merely indicate the nature of the subjects brought before the members, and give a general idea of the way in which they were dealt with. Fuller notices of the papers themselves must be reserved for future occasions.

Society of Engineers.—Arrangements have been made for the members and associates of this Society, and their friends, to visit the outfall sewage precipitation works which are now in progress at Crossness, on Tuesday next.

The Alleged Impurity of the South Metropolitan Company's Gas.—In reference to the paragraph in the Journal last week on the report by Mr. W. J. Dibdin to the County Council of the presence of sulphuretted hydrogen in the gas of the South Metropolitan Gas Company, as tested at the Plumstead station on the 6th inst., the Chief Engineer of the Company (Mr. Frank Livesey) informs us that the test of the gas was an illegal one.

The Quality of Thames Water.—In the course of a lecture on the subject of "The Water we Drink," delivered by Mr. Peregrine Birch, M. Inst. C.E., at the Sanitary Institute, on Friday, the 12th inst., the lecturer, referring to the London Water Supply, said: "From the experience of nearly a quarter of a century since the last serious cholera epidemic, it appears that if by filtration the organic matter in water be kept within limits, which are perfectly practicable at the Thames intakes, as good a water—from the point of view of the guardians of the public health—can be obtained from that river as that supplied from the chalk or from the mountain gathering-grounds. Before arriving at this conclusion, I have made a very careful examination of the Registrar-General's returns for the last ten years, and am satisfied that districts drinking Thames water have been at least as free from zymotic disease of all kinds as those supplied exclusively from the Kentish chalk and the New River, or the city of Glasgow supplied from Loch Katrine." Coming to the proposal which has frequently been made to supply the whole of London from the chalk, the lecturer stated that in his opinion this would be practically impossible, even if it were proved to be desirable to do so.

The Electric Lighting Works of the Anglo-Romano Gas Company.—The Rome Correspondent of the *Electrical Review* states that the authorities of that city have come to an agreement with the Anglo-Romano Gas Company. This Company, as our readers are aware, have for several years, in addition to their gas-works at Oerchi, carried on an electric lighting establishment. By this agreement, the Company have obtained the right of fitting up another works at Tivoli, and of distributing electric currents in certain outlying districts of the city, for lighting and other purposes. By means of the new works, the enormous water power existing at Tivoli is to be utilized for the production of an electric current. To this end about 1700-horse power is to be furnished by turbines to be erected on the spot. The current thus produced at Tivoli is to be conveyed by overhead leads to Rome—a distance of about 18½ miles. There the leads will join the underground cables in the city. The installation will be so arranged that the current coming from Tivoli can be used conjointly with that produced in the other works—that is to say, the Tivoli works will form a supplement to those at Oerchi; so that the Company have at their disposal a total of 4400-horse power. This is the first utilization, on a large scale, of remote water power for lighting a city.

The Position of Gas Workmen in America.—Referring to the possibility of the labour question shortly giving some trouble in the United States, as well as in this country, our contemporary, the *American Gaslight Journal*, in its issue just to hand, says: "As a rule, the gas makers have not had much conflict with their workmen, which is perhaps best explained from the fact that although the work is usually prolonged and always laborious, the rate of pay is good, and the workman is reasonably certain of securing as many days of labour in the year as he cares to seize. Of course, there have been times when gas makers in different sections were beset by strikes amongst their employees; but we fail to note where any of these were ultimately successful. In fact, in at least three cities known to us the determination of the gas-works proprietors to change from coal to water gas was solely caused by the antics of the retort-house labourers. And in many another works the auxiliary water-gas plant stands a silent and grim monitor, warning the retort-house employees that trifling with the timekeeper and paymaster is fraught with danger. These remarks were brought out from the facts connected with the recent strike at the works of the Cleveland (Ohio) Gaslight and Coke Company, where about 70 men threw down their tools and refused to work, because some unreasonable demand of theirs had been met with a firm refusal. Their places were speedily filled by others, some of whom, perhaps, were not so expert as those that they replaced; nevertheless, the Company was not only not crippled, but has since received the fullest admission from its misguided servants that they alone were at fault in their arrogance. Take it all in all, we are of the opinion that the gas makers need not worry themselves greatly over the outlook for trouble in the labour market, for in probably no other industry to-day does the general run of labour employed receive better wages, or make fuller time, than do those who have cast their fortunes with the gas makers."

Register of Patents.

Gas and Coke Producers.—Nicholson, T., of Hucknall. No. 9239; June 28, 1888. [6d.]

These improvements in gas and coke producers and in the apparatus for collecting the bye-products therefrom consist in giving "greater heat to the contents of the producers, the more equal distribution of such heat, a better method of applying steam for the extraction of nitrogen from the coke, and an economical method of securing the tar, ammonia, and benzol, and of cleansing the gas from sulphur and other deleterious constituents." The greater heat is obtained by an air blast supplied to the producer furnaces and by causing the heat to pass directly through the producers from the bottom and side flues; and the more equal distribution of the heat is obtained by a small chamber above the furnace. The improvement in extracting the nitrogen consists in blowing the steam into the heat chamber; and the economy in collecting the bye-products and cleansing the gas is in using a succession of small scrubbers, in conjunction with a serpentine condenser, so that it is possible to treat the gas at different stages.

Gasholders.—Ashmore, W., of Stockton-on-Tees. No. 11,790; Aug. 15, 1888. [8d.]

This invention has for its object the construction of gasholders so that either a portion or the whole of the usual columns or standards and external guide-framing may be dispensed with.

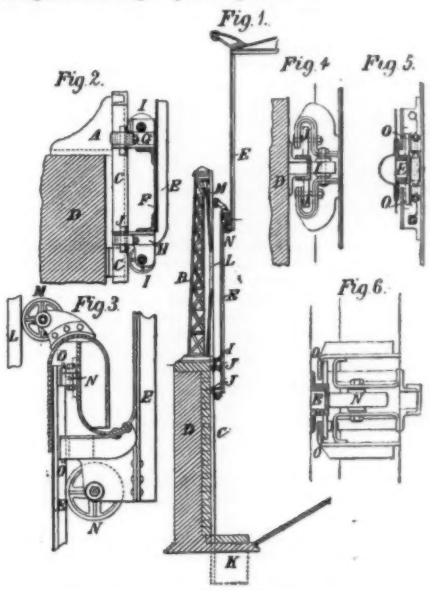


Fig. 1 is a general vertical sectional elevation of one side of a telescopic gasholder having this invention applied. Fig. 2 is a side sectional elevation of the curb, rollers, and carriages fixed to the lower part of the holder. Fig. 3 shows the dip, cup-carriages, and guide-wheels of the inner lift of a telescopic holder. Fig. 4 is a plan of fig. 2. Fig. 5 is a plan of the upper cup-carriage in fig. 3. Fig. 6 is an inverted plan of the lower cup carriage.

In carrying out this invention, if the holder is a single-lift one, it is proposed to omit the columns or standards entirely, or have only very dwarf standards, as at A, fig. 2. If the holder is one having two lifts, the standards may be omitted altogether, or there may be drawf standards, or the standards may be erected to the height of the first lift only, as at B in fig. 1. In the case of a three or more lift holder, the standards may also be entirely dispensed with, or they may be carried up only a part of the height of the holder when full.

For the purpose of guiding the holder when rising or falling, the following means are adopted. In the case of a single-lift holder, guides of rolled joist, channel, angle, or other suitable sections of iron C, are secured vertically to the side of the tank D, and extend from the top to (say) 4 feet below the general level of the bottom of the tank, and are placed at 10 to 15 feet apart. Opposite to each of these vertical guides there is also attached to the interior of the holder vertical iron or steel stays E of the usual section adopted in the inner lifts. These stays also extend some 4 feet below the bottom of the holder, and attached to the bottom of the holder and to these stays is a curb F with brackets G and H carrying radial rollers I and tangential rollers J which work against the guides in the tank. At the points where these guides are situated, pits K (fig. 1) are formed in the bottom of the tank sufficient in area and depth to receive both the guides of the tank and the curb, rollers, and carriages fixed to the holder. A single-lift holder constructed as just described will need no guide-framing or support above the liquid in the tank, except perhaps the dwarf standards A before referred to.

Gasholders with two or more lifts are constructed in a similar manner; the middle and outer lifts having external stays E fixed to their sides, which may be used also as guides, and which extend to about 4 feet below the holder itself. These stays on the inside of middle or inner lift serve as attachments for the curbs and brackets for carrying the radial rollers N and tangential rollers O; and those on the inside of outer or middle lift serve as guides against which the radial and tangential rollers of the inner or middle lift roll. By these means, what is virtually a very deep and rigid bottom curb is furnished to each holder; and the curb being provided with both radial and tangential, accurately fitted, is sufficient to maintain the holder in its proper position under all circumstances.

If, however, in the case of a two, three, or more lift holder it is considered desirable to carry up columns for a part of its height, then advantage may be taken to use them for the attachment of guides (figs. 1 and 3) against which rollers M fixed to the top of the dip may roll; but the object of this invention is to do away with the necessity of as much as the present exterior framing as possible.

GAS MOTOR ENGINES.—Dougill, J., of Manchester. No. 9578; July 2, 1888. [8d.]

This engine is constructed so that the gas and air are taken into the cylinder during the first outward movement of the piston, and are compressed into the space at the end of the cylinder (which is of greater length than the portion traversed by the piston) during its first inward movement. The mixture of gas and air is ignited at the commencement of the second outward movement of the piston; and the expansion of the gases propel it to the end of this movement, and the momentum of the fly-wheel enables the piston to perform the second inward movement.

The cycle of the engine is performed in two revolutions of the crank-shaft, and four successive movements of the piston. The valves used are, by preference, mushroom valves operated by cams and levers; the cams so formed that they give movement to the valves according to the following description. Assuming the piston to be commencing the first outward movement, the air valve is opened so as to admit air into the cylinder during the first portion of this movement—say, one-fourth or thereabout. Much will depend upon the quality of the gas used as to how much air is admitted before and after the mixture within the cylinder. The gas-valve is then opened, and the gas and air mix together and flow into the cylinder until the piston has performed about three-fourths of this movement. The gas-valve is then closed, and air alone allowed to enter the cylinder until the first outward movement is completed. The air-valve is then closed; and the piston now performs the first inward movement, compressing the contents of the cylinder into the space provided for the purpose. The combustible mixture is then ignited; and the expansion of the gases propels the piston to the end of the second outward movement. The exhaust-valve is then opened, and remains so until the piston performs the second inward movement, which expels from the cylinder the largest portion of the burnt products after combustion. A portion, however, remains in the compression chamber, which together with a portion of the air afterwards admitted, forms an envelope which surrounds the combustible mixture.

The object of the inventor is to locate the most combustible portion of the mixture admitted to the cylinder as near as possible in the middle of the cubical contents thereof, in such a manner that the combustible mixture will be enveloped by the air and non-combustible gases within the cylinder. The utility of consuming the combustible mixture within an envelope of air or air and non-combustible gases is to prevent to a large extent the flame being suddenly cooled by contact with the piston and walls of the cylinder; the heat being absorbed from the flame by the non-combustible gases which cause them to expand, and assist in propelling the piston. The air-valve is also kept cooler, in consequence of containing air alone at the time of ignition.

APPLICATIONS FOR LETTERS PATENT.

10,192.—CLEMENTS, A. E., "Improvements in and relating to electric gas lighters." July 8.

11,007.—FERNANDEZ, T. F., "The prompt, absolute, and efficacious detection of any escape or leakage of the gas called or known as 'water gas,' by incorporating, impermeating, blending, or impregnating with, or communicating or imparting to, the said gas the odoriferous properties of musk." July 9.

11,038.—WHITE, C., and MIDDLETON, A. R., "Improvements in gas-engines." July 9.

11,042.—BOULT, A. J., "Improvements in gas-burners." A communication from J. Smith and H. J. Boyd. July 9.

11,057.—RICKMAN, W. B., "Improvements in gas buoys and beacons, and in gas-lamps therefor." July 9.

11,104.—CARR, I., "Improvements connected with the manufacture of illuminating gas from coal." July 10.

11,125.—SANDERS, F., "Improvements in retorts for producing gas." July 10.

11,162.—WILLIAMS, H., "An improved incandescent tube for firing the explosive charges of gas and other similar motor engines." July 11.

11,189.—STRINGFELLOW, J. H. W., "Improvements relating to lamps for lighting, heating, and power purposes." July 11.

11,204.—JAMES, A., "An improved gas-globe." July 12.

11,207.—ABRAHAM, J. A., WORMALD, H., and ASHTON, A., "Improvements in or applicable to the supply of gas and water." July 12.

11,208.—FIELDING, J., "Improvements in gas motor engines." July 12.

11,278.—COLLINS, A. J., "An improved gas-kettle." July 13.

11,293.—DRAUTZ, A. B., "A compound gas and steam engine." July 13.

BERWICK AND TWEEDMOUTH GAS COMPANY.—The annual meeting of the shareholders of this Company took place last Wednesday. The balance-sheet showed a net profit of £1173, for the year ending May 25 last, available for dividend. The Directors recommended a dividend at the rate of 10 per cent. The Chairman (Mr. C. Hopper), in moving the adoption of the report, called attention to the reduction of 2d. per 1000 cubic feet which had been made in the price of gas. The report and accounts were adopted.

ELECTRIC LIGHTING IN EXETER.—The first meeting of the Exeter Electric Light Company is to be held this week. The Directors report that numerous obstacles were raised which greatly retarded the introduction of the electric light into the City; but they persevered in their efforts, and have now succeeded in overcoming difficulties which at one time appeared almost unsurmountable. A central depot has been purchased. The demand for electric lighting, say the Directors, has more than realized their expectations. Already a large number of arc lamps, and about 1000 incandescent lamps have been applied for. Contracts have been entered into for lighting several public buildings and places of worship; and some of the most enterprising citizens, including the proprietor of two of the principal hotels, have decided to light their premises with the electric light.

Correspondence.

[*We are not responsible for the opinions expressed by Correspondents.*]

MR. BRAY, MR. EASTWOOD, AND THE GAS INSTITUTE.

SIR,—Adverting to Mr. Eastwood's letter, which appears in your pages this week, permit me to say that Mr. Bray had left for the Continent before your issue was published, and that any reply he may wish to make must be deferred until he returns.

Permit me also to make two personal observations. I regret I cannot agree with Mr. Eastwood's assertion that during the walk to the "Criterion" he had opportunities for private conversation with Mr. Bray. Neither can I agree with Mr. Eastwood's statement that on the way he spoke about the proposed alterations of the rules; still less that he went into the elaborate details thereon indicated in his letter. In these statements I am confirmed by Mr. Sellers, with whom I spoke on the subject yesterday.

Leeds, July 20, 1889. GEO. HILL.

THE USE OF STOPCOCKS AND WATER COMPANIES' LIABILITY.

SIR,—We do not wish to follow in detail your correspondent "Night Inspector" (*ante*, p. 130). He himself says "stopcocks there must be." He has only to say "outside stopcocks," and we are so far in agreement.

Mr. W. de Normanville, of Leamington, is not correctly reported, as quoted. What he did say was "that for the *perfect* working" of the Deacon *system*, each house ought to be provided with an outside stopcock. But there is no necessary connection between the use of the meter and any particular system of inspection, nor do we ask our customers to put outside stopcocks on our account. The meter shows where waste exists. That waste is then found by the best system available—by the stethoscope if outside stopcocks exist, by day inspection of the houses if not; but in either case the value of the meter depends upon the fact that search is always directed only where waste actually does exist, not haphazard where it may.

Your correspondent, like many others, does not seem to quite grasp the difference between an ordinary meter and a Deacon meter. An ordinary meter shows only the total passed; a Deacon meter shows the full details as well. An ordinary meter, even if fitted with a "tape recorder," has reached its limit when it has given information of the total waste of a district. The Deacon meter does much more than this. It records the minutest change in the rate of flow of the water passing through it. This record is instantaneous. The closing of any valve on the district, if water is passing, produces an immediate change of the position of the pencil corresponding to the reduced flow. The difference between the flow recorded before and after the closing of the valve is a measure of the quantity of water that was passing, and is plainly readable on the diagram. Thus by simply shutting off the district piecemeal at night, leaving (say) five minutes between the closing of each valve, the pencil descends by a series of steps from the normal night flow to zero; leaving a diagram on which the waste is visibly analysed and parcelled out into as many sections as there are dividing-valves on the district. We thus get practically as many districts as there are valves available; and each valve becomes a meter, permanently fixed in position, and capable of measuring and recording in a moment the quantity of water passing through it. A simple valve at the street head becomes even preferable to a genuine meter; for the most unskilled of labourers can shut down a valve and note the time on a slip of paper, whereas not every labourer can be trusted to read a number of meter-dials correctly at night, even if the meters existed.

We could put before "Night Inspector" a diagram showing a district seven miles in extent, divided into 26 such valve-shuts, or sections, the whole process completed in three hours; and out of the 26 sections, only three show considerable waste—the remainder having either no waste or nothing worth hunting. Surely "Night Inspector" would not prefer to inspect the whole district for the sake of getting at these three sections. That a certain amount of waste-hunting can be done with an ordinary meter is certainly true; but the Deacon meter turns every valve into an instantaneous recording meter, and thus is a most efficient method of properly metering a given population.

Liverpool, July 19, 1889. WASTE WATER-METER COMPANY, LIMITED.

WOOD *V.* GRANITE PAVING.

SIR,—I should be glad if any of your readers would state their experience, and any case in point, bearing on the above matter. The following are the facts:—A Local Authority having given notice to the Gas and Water Companies of their intention to substitute wood for granite paving, which had hitherto invariably been adopted, suggested that if any repairs were needed of the mains and services, they should be attended to at once, with a view to prevent further disturbance of the pavement. After the Gas Company had examined the mains and services, and filled in the ground (leaving the surface as they found it), the contractors of the Local Authority—before proceeding to lay the wood paving, and after removing the granite pitching—stripped bare the gas mains and services, and embedded them in a thick layer of concrete, to prevent, as they stated, the sinking of the wood pavement; sending the bill, amounting to something like £500 per mile of main, to the Gas Company for payment.

If any of your readers can furnish me with information as to the course adopted in other places where wood paving has been introduced, I shall be greatly obliged.

Devonport Gas Company, July 18, 1889. J. WILLIAMS, Secretary.

INCREASE IN THE PRICE OF GAS AT CARDIFF.—The Cardiff Gas and Coke Company have just issued a notice to the effect that the reduction of 2d. per 1000 cubic feet of gas which they made some time ago is to be discontinued from the 24th of June. The reason assigned for this advance is the increased cost of coal.

AN EXPENSIVE WELL.—At the Gainsborough Local Board meeting yesterday week, an application was made by the contractor for a further payment for work done in connection with the Board's artesian well; and it was elicited that the well had now cost £4400—the original contract having been for £2423. It was decided to pay him £180 on account.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, JULY 15.

PRIVATE BILLS (ALTERATION OF MEMORANDUM OF ASSOCIATION).

The following Lords were nominated a Committee to join with a Committee of the Lower House to consider and report under what circumstances, or upon what conditions, if any, Private Bills altering the terms of the Memorandum of Association of companies ought to be allowed to pass:—The Lord President (Viscount Cranbrook), Earl Morley, Earl Crawford, Lord Herschell, and Lord Hillingdon.

The following further progress was made with Bills during the past week:—

Bills read the first time: Electric Lighting Provisional Orders Bill, Scarborough Improvement Bill, Wigan Borough Extension Bill.

Bills reported: East Kent District Water Bill, Swansea Corporation Bill, Woodhall Spa Company Bill.

Bill read the third time, and passed: South Kent Water Bill.

HOUSE OF COMMONS.

MONDAY, JULY 15.

LOCAL AUTHORITIES AND THE ELECTRIC LIGHTING SCHEMES FOR THE METROPOLIS.

Sir G. CAMPBELL put to the President of the Board of Trade the question on the above subject of which he had given notice (*ante*, p. 131).

Sir M. HICKS-BEACH said the draft Provisional Orders had in all cases been submitted to the local authorities in the Metropolis, including the County Council for London. In settling the final terms of these Orders, he had endeavoured, as far as he could, to give effect to the wishes of the authorities, but it had not been possible for him in all cases to satisfy each authority as regards every clause of the Orders. Some of the clauses inserted at the instance of the London County Council were objected to by one or more of the Vestries.

THE PAYMENT OF WATER-RATES IN ADVANCE.

Mr. J. ROWLANDS asked the First Lord of the Treasury whether he was aware that the New River Company were trying to enforce section 70 of the Water-Works Clauses Act, 1847, which gives power to water companies to collect the water-rates one quarter in advance; and whether, under these circumstances, the Government would bring in a short Bill to repeal this section, or give facilities to a Bill for the above object if introduced by private members.

Mr. W. H. SMITH: Section 70 of the Water-Works Clauses Act, 1847, provides that the water-rates shall be paid in advance by equal quarterly payments. The section has almost invariably been incorporated with every Local Act or Provisional Order by which local authorities or companies have been authorized by Parliament to make charges for the water supplied by them. It is also incorporated with the Public Health Act, 1875, and therefore applies to cases where water is supplied by sanitary authorities under the general law. The power which the New River Company possess in this respect is therefore in no way exceptional; and the repeal of the section referred to would seriously affect the statutory rights of the great majority of corporations, sanitary authorities, and companies who supply water for domestic purposes. The Government have no intention of bringing in a Bill to repeal the section.

Mr. ROWLANDS inquired whether the enforcing of the power in question had not pressed heavily on struggling ratepayers.

Mr. SMITH said the delay in enforcing the power showed, on the contrary, great moderation on the part of the Company.

Mr. ROWLANDS gave notice that he would move for leave to bring in a Bill to abolish the section in question.

TUESDAY, JULY 16.

STOKERS IN THE ROYAL ARSENAL GAS-WORKS.

Mr. CUNINGHAME GRAHAM asked the Secretary of State for War whether he was aware that large numbers of the Arsenal gas stokers were leaving their employment therein and going to other factories where the hours of labour are only eight per day; and whether he would consider the advisability of making the normal working day in the Arsenal eight hours, in order to avoid losing the services of the picked workmen in this industry.

Mr. E. STANHOPE said it was not the fact that large numbers of the Arsenal gas stokers were leaving their employment and going to factories where shorter hours of labour were the rule. Two men had lately applied for discharge in the ordinary course. The stokers in the gas factory had been informed that the question of altering the length of their working days was under consideration; but he would not take any action until he knew exactly the course adopted at similar works which were not under Government.

THE WATER SUPPLY AND SEWERAGE OF SUTTON.

Mr. J. KELLY asked the President of the Board of Trade whether his attention had been called to a statement recently made by a member of the Sutton Local Board, to the effect that 18 wells in the immediate proximity of the wells of the Sutton Water Company—one at the distance of only a few yards—had been converted into cesspools; whether he was aware that Dr. Dupré had reported the water supplied by the Sutton Water Company to be inferior to that taken from a well in the vicinity, at the top of Banstead Downs; whether, in view of the fact that the records in the Local Government Board office prove that disastrous outbreaks of enteric fever have been caused through the specific contamination by excremental matter of public water supplies, he proposed to take any, and, if so, what steps for the protection of the public health in the district supplied by the Sutton Water Company from the great dangers threatened by the cesspools in question; and whether he had any intention of introducing any legislation with a view of assisting local sanitary authorities to put an end to the monopolies enjoyed by such water companies as might show themselves indifferent to the health interests of the districts supplied by them.

Mr. RITCHIE said he had communicated with the Sutton Local Board on the subject in question, and they had informed him that there were wells, some in the sand and others in the chalk, which had been converted into cesspools. In one or two cases, on notice from the Local Board, the owners had cleaned out and filled up the cesspools; and the Local Board stated that they were endeavouring to reduce the number so as to preserve the purity of the water supply. Analyses of the water were made between January and March of last year; but none had been carried out since. The Local Government Board had for a long time been urging the Local Board to provide sewers; and as the latter showed no disposition to perform this duty, they had, after local inquiry, been declared in default by the Local Government Board. As its order was not complied with, application had been made to the High Court for a *mandamus*. This came before the Court in May, when the Local Board made excuses for delay, and obtained an extension of time. If it were necessary, the Local Government Board would apply to the Court for a peremptory order. He had no evidence that the Sutton Water Company were indifferent to the health of the district; and did not contemplate proposing any legislation on the subject.

FRIDAY, JULY 19.

ELECTRIC LIGHTING PROVISIONAL ORDERS BILL.

On the motion to read this Bill a third time,

Sir C. CAMPBELL asked whether the Corporation of Birmingham had given their consent to the Provisional Order relating to the city in an express and direct form. He suspected that the Board of Trade were going too far in letting loose electric lighting companies all over the country; and he did not think they had sufficiently complied with the spirit of the law, which required that the consent of the local authorities should be obtained before any Orders were granted.

Sir M. HICKS-BEACH entirely repudiated the policy which the honorable member attributed to the Board of Trade, of disregarding the wishes of the local authorities in this matter. On the contrary, he thought that the greatest importance should be attached to the desires of the local authority. It was not only the obvious intention of Parliament that this should be done; but it was the proper and right policy to pursue. The Corporation of Birmingham were able to take care of themselves. They were represented by as many as nine members in that House, and the Bill had gone through all its stages without a word of objection from any one of them. More than that, communications had passed between the Board of Trade and the Birmingham Corporation which showed ample evidence of the fact that the Corporation were consenting parties to the Bill. He admitted that they had not in so many words recorded their assent; but they had intimated their willingness to do so.

The Bill was then read a third time.

OTFORD SEWERAGE AND WATER-WORKS.

Mr. BRADLAUGH asked the President of the Local Government Board whether he was aware that the Board had sanctioned loans for sewerage and water supply at Otford and Dunton Green, in the Sevenoaks Union, in spite of the protests of nearly the whole of the inhabitants, and in face of the fact that these places were supplied with water admittedly not impure, and with earth-closets which were recognized by the Public Health Act as efficient means of excrement disposal; and whether, in such cases, the Board were accustomed to disregard the wishes of a whole parish, without inquiring into the motives prompting a Rural Sanitary Authority to promote expensive sewerage schemes.

Mr. RITCHIE: The Local Government Board have authorized loans for works of water supply and sewerage for the parish of Otford, which includes the villages of Otford and Dunton Green. Before sanction was given, a public inquiry was held in the locality by one of the Board's Inspectors, at which a large number of ratepayers attended. The objections raised by certain of the ratepayers to the scheme of the Rural Sanitary Authority were reported to the Board by the Inspector, and duly considered by them. Communications on the subject were also received from ratepayers after the inquiry was held; and these were also carefully considered. Evidence was given by the Medical Officer of Health that the existing water supply at Dunton Green was bad; and it further appeared that some, at least, of the houses at Otford were badly supplied. There was also evidence that sewerage was needed; and it was pointed out that if a system of earth-closets were adopted, the slop water would still have to be dealt with. I have no information to show that earth-closets have been generally provided in the places in question.

The following further progress was made with Bills during the past week:—

Bill read a second time, and committed: Gas and Water Orders Confirmation Bill.

Bills reported: Belfast Water Bill, Electric Lighting Provisional Orders Bills, Newry Improvement Bill, Rastrick Water Bill, Tunbridge Wells Improvement Bill, Wigan Borough Extension Bill.

Bills read the third time, and passed: Electric Lighting Provisional Orders Bill, Scarborough Improvement Bill.

Bill withdrawn: Barrow-in-Furness Corporation Bill.

HOUSE OF COMMONS COMMITTEE.

TUESDAY, JULY 16.

(*Before Sir* G. TREVELYAN, *Chairman; Sir* H. ROSCOE, *Mr.* STORY-MASKELYNE, *and Mr.* A. DUNCOMBE.)

METROPOLITAN ELECTRIC LIGHTING BILLS.

The Bills containing the Provisional Orders granted by the Board of Trade to various Companies to enable them to undertake electric lighting in the Metropolis, came to-day before a Select Committee, constituted as above, in conjunction with the Metropolitan Electric Supply Bill.

Mr. PEMBER, Q.C., Mr. MOULTON, Q.C., Mr. SAUNDERS, Q.C., Mr. CLAUDE BAGGALLAY, and Mr. SYDNEY MORSE appeared for the promoters of the different measures; Mr. FREEMAN attended, on behalf of the London County Council, to ask for the insertion of clauses as to the audit of the accounts of the different Companies, and as to the conditions under which they should be allowed to carry their mains over bridges belonging to the Council; and Mr. POPE, Q.C., opposed the preambles for the Vestry of St. Margaret and St. John, Westminster, and appeared (Mr. Bidder, Q.C., with him) for The Gaslight and Coke Company in support of their petitions against the Bills.

The Committee agreed to the clauses submitted on behalf of the London County Council; and decided that the Vestry Mr. Pope represented had no case. They therefore passed the preambles of certain Bills; and on the following day disposed of the remainder—all being subject to such clauses as the Committee might deem it expedient to insert. The Orders thus confirmed were the three of the Metropolitan Electric Supply Company for the lighting of South, West, and Mid London; the House-to-House Supply Order; and the Notting Hill, the Kensington and Knightsbridge, the South Kensington, the St. Martin's-in-the-Fields, and the Westminster and London Orders.

THURSDAY, JULY 18.

To-day the Committee were occupied with the consideration of clauses.

Mr. POPE, on behalf of The Gaslight and Coke Company, asked for the insertion, in all the Bills, of clauses to protect their interests.

Mr. MOULTON said that as the only opposition to the clauses was from the Gas Company, he proposed to bring before the Committee the clauses which were in the Bill.

Mr. POPE objected to this proceeding. As the promoters were not adhering to the clauses in the Provisional Orders, to which the Company did not object, he was entitled to bring forward his clauses, and call evidence upon them. This would give him a right of reply, on which he insisted. His friend had no right to make two opening speeches.

Mr. MOULTON said he only intended to explain the origin of the works clauses, and point out the way in which they met all the difficulties of the case with regard to gas companies.

The CHAIRMAN ruled in favour of Mr. Pope.

Mr. POPE then said he desired to make a few preliminary remarks, and to clear the ground by stating that the present discussion would practically settle model clauses for all similar Bills and for all gas companies. The Company he represented was the largest in London, and covered the whole area dealt with in the Orders. He should decline, as representing that Company, to bring forward clauses merely to obstruct the competition of the electric light. His clients did not desire to put forward such clauses; but only wished that wrong and injustice should not be done to those who were already in possession of the field. The position of the gas companies with regard to their right to the works they had executed had been decided by law; and that was that the companies were entitled to precisely the same protection, with regard to the pipes they had laid in the streets, as any other owner of property was entitled to. Supposing that any damage were done by an electric lighting company to the Gas Company's property, they would be entitled to bring an action against them, unless the work they were doing was protected by an Act of Parliament; and a Provisional Order had all the effect of an Act. Two things had to be provided against. First of all no danger to the Gas Company's works should be allowed; secondly, the construction of the works of the electric lighting companies should not be such as to create a network of mains which would make it difficult for the Company to get at their pipes for the purpose of perfecting their supply. The Metropolitan Company in March last accepted what were practically the same clauses. For several years past the clauses which the Gas Company proposed had, without exception, been granted to them by every railway company which had interfered, or been supposed to interfere, in any way with their works or mains; and he believed that, with perhaps trifling exceptions, they would be found to be just and right for the protection of the companies with regard to the works of the electric lighting companies. The learned Counsel then proceeded to submit the clauses proposed by the Company, which were as follows:—

By way of addition to, and not in derogation of, the provisions of the Principal Act, and of this Order and for the protection of The Gaslight and Coke Company (in this section referred to as "the Gas Company"), the following provisions shall have effect (that is to say):—

(A) Whereas in the execution of the works (other than the alteration of the position of any pipe) by this Order authorized, the mains, pipes, syphons, and other works belonging to the Gas Company may be intersected or otherwise interfered with, and it is expedient that the Gas Company should have full control over the execution of all works in any way affecting the supply by them of gas, so as effectually to provide against the supply thereof being impeded, be it therefore enacted that all works, matters, or things (other than the alteration of the position of any pipe), which under the provisions of the Principal Act or this Order the undertakers may be empowered or required to do or execute with reference to or within 5 feet of any of the mains, pipes, syphons, or other works of the Gas Company, or which under the provisions of the Principal Act or this Order are empowered or required to be done or executed by the undertakers, and may or does interfere with or prejudice the alteration, repair, user, or enjoyment of the mains, pipes, syphons, or other works of the Gas Company or the supply of gas therefrom, shall be done and executed by and at the cost of the undertakers, but to the satisfaction and under the direction of, and in such manner as shall be required by the Engineer for the time being of the Gas Company; and such works, matters, or other things shall not be commenced until after fourteen days' previous notice thereof in writing shall have been given to the Gas Company. [The Company, remarked the learned Counsel, urged for this notice. They covered a large area; and it was impossible for them to deal with a matter which might affect a remote corner of that area without proper time being given, because they could not keep a staff in every district for the purpose of following all the mains. The electric lighting companies required a month's notice for similar work.] And the undertakers shall not lay down any such mains, pipes, syphons, or other works so as to interfere with the observance of the regulations or directions of any Act of Parliament relating to the Gas Company. [The Gas Company, he explained, were bound by Act of Parliament to lay down their mains under certain conditions; and clearly the electric light companies should not be empowered to lay down their mains so as to prevent the Gas Company from complying with their own Act.] Provided always that, if the Gas Company shall elect themselves to execute any portion of the works, matters, and things which the undertakers may by this Order be empowed or required to do or exercise with reference to or affecting the mains, pipes, syphons, apparatus, or other works of the Gas Company, and of such their election shall give seven days' notice in writing to the undertakers by leaving the same at their head office, the Gas Company may themselves execute that portion of the said works, matters, and things; and the reasonable expense of and incident to the executing the same shall be repaid by the undertakers to the Gas Company. Provided also that in cases of sudden emergency arising from defects in any of the pipes or other works of the undertakers which may require to be remedied without delay, the notice to be given as aforesaid shall be given at the earliest possible time, and not later in any case than immediately upon the commencement of the work. [It would be provided by another clause that, in case of emergency, the period of notice might be dispensed with; but notice was required to be given not later than the commencement of the work, so that the gas company's representative might be on the spot to see what was done]. In default of any such notice as by this clause required being given, the undertakers shall (without prejudice to any other remedy of the Gas Company) forfeit or pay to the Gas Company a penalty not exceeding £20 and any expenses the Gas Company may incur through the absence of such notice.

(B). If any interruption whatsoever in the supply of gas by the Gas Company, or any loss or escape of gas, shall be in any way occasioned or sustained by any act or omission of the undertakers, or by the acts of any of their contractors, agents, workmen, or servants, or any persons in the employ of them, or any or either of them, the undertakers shall indemnify the Gas Company against all penalties and costs to which the Gas Company shall become liable in consequence thereof, and in addition shall pay to the Gas Company the value of the gas so lost. If the undertakers shall find it necessary to undermine, but not otherwise alter the position of any main, pipe, syphon, or other works belonging to the Gas Company, they shall temporarily support the same in its position during the execution of their works, and on their completion shall provide a good and suitable foundation for every main, pipe, syphon, or other work so undermined.

(C) Nothing in this Order shall authorize the undertakers to employ any of the works, mains, or pipes of the Gas Company, or any works, culverts, mains, or pipes in connection with those of the Gas Company, as supports for any works of the undertakers, or as conductors for the purpose of completing the electric circuit; and the undertakers are hereby prohibited from so employing any of such works, culverts, mains, or pipes, or from in any way bringing their electric mains, wire, or services into contact with or nearer to such gas works, mains, or pipes than shall be agreed upon between the Engineer for the time being of the undertakers and the Engineer for the time being of the Gas Company.

(D) Wherever an electric line, wire, tube, main, or other apparatus for the supply of electricity shall cross or be liable to touch gas mains, pipes, or services, it shall be thoroughly encased in an insulating covering to the satisfaction of the Engineer of the Gas Company for the time being.

(E) The expense of all repairs or renewals of the said pipes or mains, or any works in connection therewith, which may at any time hereafter be rendered necessary by the acts or defaults of the undertakers, their contractors, agents, workmen, or servants, or any person in their employ, shall be borne and paid by the undertakers.

(F) Notwithstanding anything in this Order contained, the undertakers shall be responsible for and make good to the Gas Company all costs, losses, damages, and expenses which may be occasioned to the Gas Company, or to any of their mains, pipes, syphons, apparatus, property, works, and conveniences, or of any loss of gas or interruption in the supply of gas by the Gas Company, or otherwise, including injury and loss by explosion through, by reason of, or consequent on the execution or failure of any of the intended electric works and apparatus, or of any act or omission of the undertakers, or of any of their contractors, agents, workmen, or servants, or any of the persons in their employ or in the employ of their contractors or others; and the undertakers shall effectually indemnify and hold harmless the Gas Company from all claims and demands upon or against them by reason of such execution or failure, or of any such act or omission.

(G) Except in cases of sudden emergency arising from any defects in any of their mains, pipes, or other works which may require to be remedied without delay, the Gas Company shall not execute any work, so far as it immediately affects the supply of electricity, except under the superintendence of the undertakers, unless they refuse or neglect to give such superintendence at the time specified in the notice for the commencement of the work, or discontinue the same during the progress of the work; and the Gas Company shall execute such work at their own expense and to the reasonable satisfaction of the undertakers. Provided that any additional expense imposed upon them by reason of the existence of an electric line, wire, tube, main, or other apparatus for the supply of electricity in any road or place where any mains, pipes, syphons, and other works belonging to the Gas Company shall have been laid before the passing of this Order, shall be borne by the undertakers.

(H) Nothing in this Order shall take away or abridge any power to open or break up any road along or across which any electric line, wire, tube, main, or other apparatus for the supply of electricity is laid, or any other power vested in the Gas Company, for the purpose of laying down, repairing, altering, or removing any pipe for the supply of gas, or other work, but in the exercise of such power the Gas Company shall be subject to the following restriction (that is to say):—(1) They shall cause as little damage or inconvenience to undertakers as circumstances admit of. (2) Before they commence any work whereby the supply of electricity will be interrupted, they shall, except in cases of urgency arising from defects in any of their mains, pipes, or works, in which cases no notice shall be necessary, give to the undertakers notice of their intention to commence such works, specifying the time at which they will begin to do so; such notice to be given forty-eight hours at least before the commencement of the work. (3) Any difference arising between the undertakers and the Gas Company respecting any of the matters referred to in this clause shall be determined by arbitration.

There were two additional clauses) one a general saving clause, and the other a clause as to arbitration), as follows:—

(I) Except as is by this Order expressly provided, this Order, or anything herein contained, shall not take away, diminish, alter, or prejudice any of the rights, powers, privileges, or authorities of the Gas Company.

(J) Any difference (not being a question relating to a penalty recoverable summarily, or to an injunction or *mandamus*) which may arise between the Gas Company and the undertakers under or out of the provisions of the Principal Act or this Order, shall, at the request of either party, be determined by arbitration. The award made upon any such arbitration may be enforced as though the same were a judgment or order of the Queen's Bench Division of Her Majesty's High Court of Justice. The Board of Trade, if it thinks fit, may at the request of either party appoint a legal arbitrator or a legal assessor to the lay arbitrator appointed by the Board. The remuneration of any arbitrator or assessor appointed by the Board shall be fixed by the Board, and shall form part of the costs of the reference.

The following evidence was then called in support of the foregoing clauses:—

Mr. *J. Orwell Phillips*, Secretary and General Manager of the Gas Company, examined by Mr. BIDDER, said the undertaking as it was at present was the result of a number of amalgamations with other Metropolitan Gas Companies; and their area embraced nearly the whole of London north of the Thames, as well as part of London south of the river. Their capital was £12,000,000; and last year 19,000 million cubic feet of gas were sold by them. The Company had 206,000 private consumers; supplied gas to 55,000 street lamps; and last year they paid £160,000 in rates and taxes. Their principal works were at Beckton; and they had ten subsidiary works. All the streets, courts, and alleys in their district were laid with their mains, of which there were 1850 miles; the pipes ranging from 4 feet in diameter downwards. It was only within the last few weeks that really serious operations had been undertaken for the electric lighting of the Metropolis; and these were by the Kensington and Knightsbridge Company. The clauses submitted were first of all incorporated in the Metropolitan Railway Act of 1876. In 1882 they were inserted in five separate Acts of Parliament relating to railways; and since then they had been conceded, without the Company having to appear, in nearly every Railway Act, as well as in the Columbia Market Act of 1887 and in the Westminster Improvement Act of the same year. Witness then detailed the parliamentary obligations of the Company with regard to the supply of gas. He said he had given careful consideration to clauses 16 and 17 of the Provisional Orders (as to the alteration of pipes, wires, &c., under streets, and the laying of electric lines, &c., near the mains of gas and water companies); but he did not consider they were sufficient for the protection of his Company. The Directors were advised that, although the clauses were valuable for the Metropolitan Water Companies, they stopped short of the protection necessary for a great undertaking like The Gaslight and Coke Company, and against any accident, which might involve large destruction of property and loss of life. The danger of interruption in the supply of gas must be specially provided against; and he illustrated the importance of this point by stating that all the railway signals of the metropolitan railways were lighted with their gas. The Directors had been obliged to take legal proceedings, during the past five years, against the parochial authorities, especially with regard to steam-rollers of excessive weight, for the protection of their pipes and property, and in every instance they

had succeeded, and obtained costs against the authorities. In many parts of the Company's district there was very shifty soil, and the subsidence of any part of it might cause a fracture of their mains, which meant leakage of the gas; consequently protection was necessary in the operations proposed to be commenced under the authority of these Bills. It was almost impossible to lay mains in any street in the Company's area without coming into close proximity with their mains. Within the last few weeks the Kensington and Knightsbridge Company had been constructing in Ennismore Gardens a large culvert for their wires. They did not give any notice to the Gas Company, although they were including in the culvert part of the Company's mains where there was a jointing of the pipes; and consequently great danger was incurred of loosening the joint and subsequent leakage, with all its attendant dangers. The Gas Company had in the streets, in addition to the mains, large syphons and valves which were indispensable for the regulation of the pressure and supply of gas. Looking at the extent of the Company's district, he did not think the 48 hours' notice given by clause 17 was sufficient, for no staff of any company could cope with all emergencies at a moment's intimation. He was advised that the provision that the Company's representatives should superintend the digging of the trenches, was insufficient for the protection of their property. The Company were under stringent obligations as to the manner in which they laid their mains in the streets; they had to place the pipes at a distance of at least 4 feet from any water-pipe. The 5 feet the Company proposed in their clause was not prohibitive; but only what was necessary for the work to be properly done. *A fortiori* the danger was far greater in the case of electric than in the case of water mains. Clause B was inserted because of the great inconvenience which any interruption of the supply would cause. All the clauses had been carefully considered, and only that which was deemed to be absolutely necessary had been asked. The Company's desire was to work in the greatest possible amity with the electric lighting companies; for they believed that there was plenty of room for both. They could be of much assistance to the companies by giving information to them as to the best positions in the streets for laying their mains; and they would readily place their plans of the street mains at the companies' disposal. This would save them many thousands of pounds a year. At the beginning of the session the Metropolitan Electric Supply Company agreed to clauses essentially the same as those now submitted by his Company.

In answer to Mr. LOYD, witness said his Company only desired proper notice of intended works by the electric lighting companies; and with regard to the case to which he had referred—that of the Electric Supply Company—they were wise enough to accept the suggestion of his Company. The Gas Company did not seek for any favour in the clauses they had submitted or in their treatment.

In cross-examination by Mr. CRIPPS, witness said that under section 16 the gas companies and the electric lighting companies would be in the same position with regard to undertakings.

Mr. CRIPPS: Would you object to use the word "operators" in the same way in your new clauses as it is used in clause 16?

Witness: I do not know what the effect would be.

Mr. POPE said that it might mean that it was something more than what was reciprocal; and the Company could not agree to that.

Witness: If you mean reciprocity, I am with you.

Mr. CRIPPS: On every clause?

Witness: Certainly.

Do you not consider that clause 16 gives you all protection against any danger in case of any default on the part of the undertakers?—I am not a lawyer, and therefore cannot answer that question.

Mr. POPE: No danger would be met. That clause affords a remedy by action for damages in case of accident; but we want to prevent an accident.

Mr. CRIPPS (to witness): With proper insulation, is there any danger not provided for by section 16?

Witness: There is the case I have mentioned—that of Ennismore Gardens.

In further cross-examination by Mr. CRIPPS, witness said he did not consider that either clause 16 or clause 17 provided sufficiently for an interruption of their supply. So far as ordinary proceedings were concerned, he thought there was protection enough by clause 17; but Counsel advised them that this was not the case in the extraordinary circumstances of his Company, with their large area, their service-pipes to private houses, &c. He did not think it gave sufficient protection in the case of a large main-pipe.

Mr. CRIPPS: But we cannot dig a trench except under your supervision?

Witness: The Engineer will tell you more about that matter.

Are any of the cases to which you have referred, where the clauses were accepted, analogous to the present?—I think so. The railway companies had to make many excavations and alterations in streets, interfering with our mains and pipes.

But the provisions in all the other cases are fewer in number and detail than they are here?—They are more here because we are dealing with electric lighting companies; and, of course, in that respect there is some difference.

Do you recollect that this question of protection was fully gone into when the General Act of 1882 was considered?—I do.

No special clauses were introduced for the protection of the gas companies in that Act?—I believe not.

The only provision given in the General Act maintaining the law with regard to the gas companies is incorporated in each of the present Provisional Orders?—It is.

The gas and electric lighting companies were put by the Act of 1882 in a position of equality with regard to the breaking up of the streets?—I believe that is so.

Setting aside all legal and technical matters, why is it that The Gaslight and Coke Company should have a protection different from all other companies in the Metropolis?—I think the Engineer will give you the reason.

Why should you have a special arbitration clause when there is one provided by the Act of 1882?—That is a matter in the mind of the draftsman.

Mr. POPE: The clause of 1882 refers only to matters under that Act.

Mr. CRIPPS: No; it also refers to any Licence granted under the Act, and these Provisional Orders refer to such.

The CHAIRMAN: Is this general provision embodied in the Provisional Orders?

Mr. POPE: It is; but that arbitration clause is applicable only to matters directed by the Act of 1882 to go to arbitration. Our arbitration clause provides that all disputes under our clause shall be referred to arbitration, and that there shall be a legal assessor.

Mr. SAUNDERS (who represented the Kensington and Knightsbridge Electric Light Company) also cross-examined witness, who, in reply, said he knew that that Company worked under a Licence which contained the same clauses. He had no complaint to make as to the way in which they had worked.

By Mr. MORSE: The Chelsea Company worked under a Provisional Order Act of 1886. They had laid all their mains after notice to the Gas Company's inspector; and he had not heard of any complaint.

Mr. FREEMAN said the clauses submitted were inconsistent in some respects with those already allowed for the protection of the London County Council; and he asked the witness if he was willing to give proper protection to the rights of the Council.

Witness: Certainly.

Re-examined: The Chelsea Company had at present only a small area There were cases in which the Gas Company would prefer to do the work in connection with excavations near or at important mains; and the clauses in the Bills recognized this principle so far as any alteration in the position of pipes was concerned.

By the CHAIRMAN: The Gas Company did not appear before Major Marindin during his inquiry. There were many houses in the district of his Company unconnected with their mains; but the mains of the electric lighting companies must come near to those of the Gas Company.

The CHAIRMAN: Do you object to the words "near to," in clause 16, as insufficient?

Mr. POPE: Our objection is that they are too vague.

Mr. MOULTON remarked that the Committee must recollect that the electric lighting companies were bound to lay their mains according to the regulations of the Board of Trade.

In reply to further questions by the Committee, witness said that one of the Company's officers was present whenever a railway company excavated near their mains or pipes. There were no mains of any other gas company in the area covered by The Gaslight and Coke Company.

Mr. *Corbet Woodall*, C.E., was then called, and examined by Mr. BIDDER. He said he had had large experience as a Gas Engineer, and was now the Engineer of the London Hydraulic Power Company, which had 40 miles of mains in the streets of London. Most of the important thoroughfares were crowded with mains of gas, water, telegraph, and telephone companies, and consequently great care was required in any excavations which had to be carried out. The soil of London was "made," and not natural; but it was thoroughly consolidated, although there might be considerable subsidence if there was any disturbance. There must be a certain inclination in gas-pipes, so that the water which collected in them might run off to the syphons; and therefore it was of importance that, in the case of alterations, the gas companies should make them themselves. With regard to leakage, much more care had to be taken in the laying of gas-pipes than of water-pipes; and a breakage of the former was difficult to discover, owing to the peculiar way in which the escaped gas frequently travelled. The principal causes of fractures in gas-mains were settlements under the pipes or excessive pressure above them. The service-pipes, being of iron, required frequent examination and renewal; and it was of importance that nothing should be placed over them which would prevent such work. He thought that protection was necessary alike when gas-pipes were interfered with and when work was undertaken in proximity to them. If the 5-feet distance was to be maintained all along between the mains of a gas company and those of an electric lighting company, he considered it would be excessive. He was of opinion that a limitation was undesirable. The proper thing was that notice should be given to the companies interested. He understood that the 5-feet limit was that in which the Gas Company desired to have the right to interfere as to the laying of the mains of the electric lighting companies; and he considered this was reasonable. He did not think that notice of 48 hours for intended works was sufficient. The clause allowing a gas company to superintend the digging of any trench was of very little value because of that part of it which provided for what was described by Mr. Bidder as "innocent ignorance." By the building of a gas-pipe into an electric light culvert, there might be a fracture of the pipe, if there happened to be a subsidence of the surrounding soil; and he thought the clauses in the Bill did not give sufficient protection against such an occurrence. He could not see that there was anything obstructive or unreasonable in the proposed clauses. He was of opinion that provision should be made for the effective separation of the gas and electric mains. Ten per cent. of gas made a most explosive mixture; and there had been several cases where, from casual fracture, the accumulations of gas had caused violent explosions and serious damage. He strongly adhered to the principle of arbitration.

Cross-examined by Mr. MOULTON: Any interference with gas-mains should be made by skilled gas engineers; and any interference with electrical works should be carried out by skilled electricians. He thought clause 17 was insufficient, because it was limited almost entirely to the digging and sinking of the trench, and excluded the works to be done in that trench. Then the arrangements in the clause whereby the arbitrators were relieved because of ignorance were insufficient. The superintendence was likely to prove ineffective; there being no proper provision to secure reasonable compliance with the requirements of the Gas Company's officers. The time of notice was insufficient; and he also objected to the provision with regard to the penalty.

The CHAIRMAN said the principal requirement of the Gas Company in regard to clause 17 was that, like clause 16, it should allow them to do certain work themselves.

Cross-examination continued: He thought that a week's notice was fair for all new works; but there were special cases when less should be required.

Mr. MOULTON said he would not object to this, if it was not too onerous for the Gas Company.

Mr. POPE: But whatever this witness may say, we require 14 days' notice.

Mr. MOULTON (to witness): You say the Company should superintend the carrying out of the works, as well as the digging of the trench?

Witness: Certainly.

Mr. MOULTON said his clients would not object to that.

Mr. POPE said his learned friend could not settle this question summarily in that offhand manner, because Mr. Woodall might not come up to the standard of the Gas Company in this matter.

Mr. MOULTON (to witness): Can you imagine anything more direct or peremptory than the provision that the operator "shall conform with such reasonable requirements"?

Witness: I can. You could strike out "reasonable," although I do not say it would be right to do so. My objection is that there is no machinery here for determining what is a "reasonable requirement."

You think there should be arbitration on this matter?—Certainly.

Mr. BIDDER: Are the works to be suspended during the arbitration?

Mr. MOULTON: That is a matter for argument. (To witness:) Do you think it fair that there should be a penalty as well as compensation when it was a case of emergency, and the requirements and restrictions of the section had been complied with so far as was reasonable?

Witness: It seems to me that a penalty would be more suitable than compensation, because the former would cover the case of acting without proper supervision or notice.

You wish to make clause 17, dealing with new works, agree more with clause 16, dealing with repairs?—I do.

You want the Gas Company to have an alternative to do the works other than the electric works, and to let the electric lighting company

have a similar right with regard to works other than those for gas?—That is so.

It was explained to the Committee that the Court which would have jurisdiction under section 17 was that of a Metropolitan Police Magistrate.

Re-examined: He thought that the alternative of the Gas Company themselves undertaking the work under clause 17 would be better than arbitration, which must delay the work. The manner in which the work had been done could subsequently be settled.

Witness stated that he withdrew what he had said about the penalty, because his objection on that ground had been made under a misapprehension.

Mr. *G. C. Trewby*, Chief Constructing and Carbonizing Engineer of The Gaslight and Coke Company, said that recently all the electric lighting companies working in London had been opening the streets in the district of his Company, and only three of them had given notice, and this of a general character, which did not allow them to judge what interference with the Company's mains was contemplated. Serious damage might be done if the work in the streets were covered up before his Company's officers could ascertain what had been done. In the instance of the Knightsbridge Company, in many cases the whole space between the cellar vaults and the pavements had been filled in by the culvert for the electric mains; and the consequence had been that the gas service-pipes had been built into these chambers. This was a most inconvenient arrangement, to which he could never recommend his Company to assent. [Witness produced plans showing the work.] This was done without any notice to the Company, and without their previous knowledge. He had to threaten an injunction. The Chelsea Company did not use a culvert, but a box of asphalte.

The CHAIRMAN: The Committee quite recognize the seriousness of full notice, and of the gas and electric companies working together in laying down their pipes; and we want our attention directed to the arrangements to be made.

Mr. BIDDER said he would pay attention to this intimation. He was then proceeding to ask the witness as to fractures, when he was again interrupted by

The CHAIRMAN, who said the Committee recognized and knew the importance of this part of the case, and what they wanted to ascertain was what precautions were necessary.

Examination continued: He considered that the 48 hours' notice of new works, given by the 17th clause, was insufficient for them to ascertain what was necessary by way of precaution. Although it would be seldom exercised, he thought it was right that the Gas Company should have the option of executing the works dealt with by that clause. When the mains of an electric light company came within 5 feet of a gas company's mains, he thought the gas company should have a voice in the matter of the electric company's mains. He attached great importance to having ready access to all the mains and service-pipes belonging to his Company.

Mr. MOULTON said he was prepared to prove that notice was given in the Kensington instance; but he would not go into that part of the case, as they seemed to be approaching an agreement.

In cross-examination by Mr. MOULTON, witness said that when he spoke of 5 feet he meant 5 feet horizontally. He knew that the electric lighting culverts were placed very near the surface. The gas-mains were laid about 2 feet deep.

By Mr. FREEMAN: Their mains crossed Westminster Bridge, Lambeth Bridge, and Vauxhall Bridge; and were laid along the Embankment.

Mr. FREEMAN: If you want to have the option of doing the work yourselves, how would that be consistent with the right already given to the London County Council to exercise that option?

Witness: It certainly would clash.

Mr. FREEMAN: And who is to give way?

Mr. BIDDER: If there is any clashing, that is a matter for arrangement.

Mr. FREEMAN said he had secured his point.

In reply to Mr. DUNCOMBE, witness said that no damage was sustained to his Company's property in the laying of the Knightsbridge culvert so far as he was aware. But the ground was filled in; and they really did not know how the work had been done. They would have objected to it had they had notice; but anything unpleasant was avoided by the electric lighting company informing them of all cases where the gas-pipes had been built in.

Mr. BIDDER then remarked that he would proceed to the electrical part of his case.

Mr. MOULTON said he desired to state the concessions he would be ready to make with regard to clause 17; and after some discussion, he was allowed to do so. His clients were prepared to amend the clause by giving 7 days' notice instead of 48 hours' notice; by allowing a right of superintendence of the execution of the work mentioned in the clause; and by giving the Gas Company the option of themselves performing the work, exclusive of the electrical part, if the London County Council did not exercise the prior option which they had under the Bill.

Mr. BIDDER said he accepted the compromise, with the exception of the notice, which he would argue should be 14 and not 7 days. He would therefore now proceed with the electrical evidence.

Mr. *J. Swinburne*, Electrical Engineer, was then called, and said he had also had some experience as a Gas Engineer. There were many alternative methods of laying electrical mains; and he thought that the culvert system was objectionable, on the ground that explosions were more possible if gas found its way into the culvert.

Mr. MOULTON said he was quite willing that there should be perfect insulation.

A discussion then ensued as to the points of agreement between the parties. In the course thereof,

Mr. MOULTON said he agreed that no part of the gas-mains should be used as an electric circuit, or as a pediment for an electric lighting company's works; and that the insulation should be by a system to be approved by an arbitrator appointed by the Board of Trade.

Mr. BIDDER accepted these statements; and it was agreed to draft clauses accordingly.

On clauses B and F proposed by the Gas Company, a discussion also took place; but

The CHAIRMAN intimated that the Committee were agreed that clause 75 covered everything that was necessary with regard to the subjects mentioned in these two clauses.

Clause G—the reciprocal clause—was abandoned, on the statement by Mr. Moulton that it was not wanted by his clients.

With reference to the clause dealing with arbitration, Mr. MOULTON undertook to bring up a clause providing for arbitration in the case of dispute under clause 17.

FRIDAY, JULY 19.

Mr. A. GRAY, on behalf of the Board of Trade, said he desired to state the view of the Board in reference to the clauses which the Gas Company and the promoters were agreeing upon.

Mr. BIDDER remarked that they were so near a settlement, that he considered it would be altogether unnecessary for Mr. Gray to make such a statement.

Mr. GRAY said that his observations would assist the learned Counsel to arrive at a conclusion. The Board of Trade had no objection to the proposed extension of the time of notice in the case of digging or sinking trenches; nor had they any objection to a clause providing for undermining and support to be given to the works of the other owners concerned. The Board did not object to another amendment suggested as to the insulation of the wires, provided that their power of making regulations as to the supply to, and safety of the public was safeguarded. The Board, however, desired to express their opinion with regard to the following provision which it was now proposed to be inserted in clause 17:—"The owners may, upon giving notice to the undertakers during the fourteen days hereinbefore referred to of their desire to execute any work to which the provisions of this section apply, themselves execute the same; and in case they give such notice, they shall execute such work with due care and diligence, and shall be subject to the like restrictions and conditions as the operators would themselves be subject to in respect of the same, and the reasonable costs of executing such works shall be repaid by the operators to the owners: Provided always that the provisions of this paragraph shall not apply so long as any notice for the County Council, the local authority, or other body or person, under the provisions of section 15 of this Order, remains in force." He said that, from a remark which was made by the Chairman on the previous day, he gathered that he was anxious to know why the provisions in section 16 of the Provisional Order as to reciprocity as between the different Companies in the case of alterations of pipes were not contained in clause 17, which dealt with the digging and sinking of trenches. The reason was that, by the fourth section of the Act of 1882, "the Board of Trade may by Provisional Order authorize any local authority, company, or person to supply electricity . . . . but in all other respects subject to the provision in the last section contained with respect to Licences." The provisions of the preceding section were as follows:—"Where, in any area or part of an area in which any undertakers are authorized to supply electricity under any Licence, the undertakers themselves are not the local authority, the Licence may contain any provisions and restrictions which the Board of Trade may think expedient for enabling the local authority to exercise any of the powers of the undertakers under this Act with respect to the breaking up of any street repairable by such local authority." This clause authorized reciprocity only between the local authority and the undertakers. Section 15 of the same Act contained powers for the reciprocal working as to the alteration of pipes, giving "any local or other public authority, company, or person 'power' in like manner to alter the position of any electric lines or works of the undertakers which may interfere with the lawful exercise of any powers vested in such public or other local authority, company, or person." Therefore the Board of Trade had power to provide for reciprocity between the local authority and the electric company with regard to the digging of trenches and the breaking up of the streets, but not for reciprocity between the electric company and any other company. Under the same Act, however, they could provide, in the case of the alteration of pipes, for reciprocity between the operators and the owners. He would therefore point out that, if this power were granted in this case, for the Gas Company to break up the streets and dig trenches for the purposes of electricity, it would be a power which the Board of Trade would never insert in any Licence or in any Provisional Order, as it was *ultra vires;* and, far from this being a model clause which would be inserted in every Order for electric lighting, it would be a clause which would require to be inserted in each case by the Committee who considered the Provisional Order Bill. No doubt the greatest care had been taken by the learned Counsel for the promoters to make the clause as workable as possible; but there were other considerations with regard to the conflict between this clause and that enabling the local authority to exercise the option, which he was afraid would lead to great difficulties. This was, however, a point of less importance than that which he had first brought under the consideration of the Committee.

Mr. PEMBER suggested that Counsel should have a consultation and agree as to a clause which would be satisfactory to all parties.

Mr. BIDDER, in expressing his approval of this suggestion, said he must remark that the Board of Trade seemed to have very imperfectly apprehended what had taken place at the previous meeting of the Committee. The Board did not understand what was meant by reciprocity. The reciprocity that had been agreed to in the case of the Gas Company was that, on the one hand, the Gas Company should have the option to do the work of digging the trenches of the electric lighting companies, where it was thought only fair they should have that option; and that, on the other hand, the electric lighting companies should have the option of digging the trenches of the Gas Company where it was thought fair that they should have that option. As to suggesting that the Board of Trade had not the power under the Act of 1882 to authorize such reciprocity, a great deal had happened since the General Act was passed, and such reciprocity was allowed in the case of the alteration of pipes.

Mr. FREEMAN said that the clause referred to by Mr. Gray, and brought up by the promoters, was totally inconsistent with the requirements of the County Council, and could not be accepted by him.

Counsel then retired to agree upon a clause; and, on their return, after an hour's absence,

Mr. PEMBER stated that they had settled everything.

Mr. FREEMAN complained that he had been altogether excluded from the conference.

Mr. PEMBER said that was the case, as they had considered this was a matter solely between the Gas Company and the electric lighting companies; and they had agreed to the clause. He considered that it was beyond the powers of the Board of Trade to insert on their own authority such a reciprocity clause as was now proposed; but he asked Parliament, if the Committee thought it was fair and reasonable, to say that such a reciprocity should be given. This could be done by a recital in the preamble that the Orders had been amended by Parliament in Committee, and that Parliament confirmed the Provisional Orders as amended.

Mr. POPE expressed his concurrence with his learned friend; and said, while the Board of Trade were limited by the Act of 1882, there was no limitation of the power of Parliament. The only difficulty which could arise would be if the Provisional Order was confirmed in general terms; for then it might be urged that only that had been confirmed which the Board of Trade had power to make by Provisional Order. But the procedure suggested by Mr. Pember would get over this difficulty. The clause which had been agreed upon had been arrived at by mutual concession; and he hoped the Committee would accept what the two interested parties had considered sufficient for their interests.

Mr. GRAY agreed that the Committee had the power to make the alterations if they thought the magnitude of the undertakings justified them in doing so. The responsibility would, of course, then be removed from the Board of Trade to Parliament itself.

The CHAIRMAN: I conceive that the insertion of this condition only

resembles the insertion of other conditions mentioned in the Act. If Parliament thinks it an undue provision, they must strike it out.

Mr. SAUNDERS expressed his agreement with what had been said by Mr. Pember and Mr. Pope. He remarked that the only difficulty which had not been overcome was that the clause they had agreed to could not be a model clause.

A new clause was then agreed upon, as to the laying of mains under special agreement, as follows:—

Twenty-eight days at the least before commencing to lay in any street any electric line which is intended for supplying energy to any particular consumer, and not for the purposes of general supply, the undertakers shall serve upon the local authority and every owner or occupier of premises abutting on so much of the street as lies between the points of origin and termination of the electric line so to be laid, a notice stating that the undertakers intend to lay such electric line; and if within the said period any two or more of such occupiers shall require in accordance with the provisions of this Order that a supply shall be given to the premises in his or their occupation, the necessary distributing-main shall be laid by the undertakers at the same time as the electric line intended for such particular consumer.

Mr. PEMBER then produced the proposed clause in substitution of clause 17 in the Orders for the laying of electric lines, &c., near those of gas or water companies, and near sewers, &c. It was as follows:—

Wherever the undertakers require to dig or sink any trench for laying down or constructing any new electric lines (other than service lines) or other works near to which any sewer, drain, watercourse, defence, or work under the jurisdiction or control of the County Council or of any local authority, or any main pipe, syphon, or other work, belonging to any gas or water company, or any branch or service-pipe for the supply of gas or water has been lawfully placed, or where any gas or water company require to dig or sink any trench for laying down or constructing any new mains or pipes (other than service-pipes) or other works near to which any lines or works of the undertakers have been lawfully placed, the undertakers, or such gas or water company (as the case may be), in this section referred to as the "operators," shall, unless otherwise agreed between the parties interested, or in case of sudden emergency, give to the County Council or local authority or to such gas or water company, or to the undertakers (as the case may be), in this section referred to as the "owners," not less than fourteen days' notice before commencing to dig or sink such trench as aforesaid, and such owners shall be entitled by their officer to superintend the work. And the operators shall conform with such reasonable requirements as may from time to time be made by the owners or such officer for protecting from injury every such sewer, drain, watercourse, defence, pipe, electric line, or work, and for securing access thereto; and they shall also, if required to do so by the owners thereof, repair any damage that may be done thereto. And where the operators find it necessary to undermine, but not alter, the position of any sewer, drain, watercourse, defence, pipe, electric line, or work, they shall temporarily support the same in position during the execution of such works; and on completion, provide a suitable and proper foundation for the same where so undermined. The owners, upon giving notice to the undertakers, during the fourteen days hereinbefore referred to, of their desire to execute any work to which the provisions of this section apply, may themselves execute the same; and, in case they give such notice, they shall execute such work with due care and diligence, and shall be subject to the like restrictions and conditions as the operators would themselves be subject to in respect of the same, and the reasonable costs of executing such works shall be repaid by the operators to the owners: Provided always that the provisions of this paragraph shall not apply so long as any like notice from the County Council, the local authority, or other body or person under the provision of section 15 of this Order remains in force: Provided always that, when the undertakers or Gas Company desire to lay a service or pipe-line to a house or premises already connected by a service or pipe-line with the works of the undertakers or the Gas Company (as the case may be), 48 hours' notice shall be given by the undertakers or the Gas Company (as the case may be) to the other of them; and in that case, the provisions of this section, as far as applicable, shall then apply to such service or pipe-lines accordingly. Whenever any electric line shall be laid down crossing or liable to touch gas-mains, pipes, or services, the conductor carrying the electric current shall be effectively insulated in a manner approved by the Board of Trade. The undertakers shall not, except with the consent of the Gas Company, lay down any electric lines so as to come into contact with any mains or pipes of any gas company or owner, nor employ any mains or pipes of any gas company as conductors for the purpose of completing the electric circuit, or for the conveyance of electric currents. Any question or difference which may arise under this clause shall be determined by arbitration. If the operators make default in complying with any of the requirements or restrictions of this section, they shall make full compensation to all owners affected thereby for any loss, damage, penalties, or costs, which they may incur by reason thereof; and in addition thereto, they shall be liable to a penalty not exceeding £10 for every such default, and in the case of a continuing offence to a further penalty not exceeding £5 for every day after the first day during which such default continues: Provided that the operators shall not be subject to any such penalty if the Court having cognizance of the case shall be of opinion that the case was one of emergency, and that the operators complied with the requirements and restrictions of this section so far as was reasonable under the circumstances, or that the default in question was due to the fact that the operators were ignorant of the position of the sewer, drain, watercourse, defence, pipe, electric line, or work affected thereby; and that such ignorance was not owing to any negligence on the part of the operators. For the purposes of this section, the expression "gas or water company" shall include any body or person supplying gas or water.

Mr. FREEMAN objected to the proviso which had been inserted for the protection of the London County Council as too limited, and not covering the rights of the Council under the other sections. He therefore asked for the substitution of the following:—"Provided always that the provisions of this paragraph shall not affect or derogate from the provisions in this Act contained for the protection of the County Council, or the local authority, or any body or person."

A discussion ensued as to whether this should be substituted in place of, or added to the original proviso; but on objection being taken by Mr. Loyd to the proposal of the learned Counsel,

The CHAIRMAN said that, as Mr. Freeman could not show that any power of the London County Council was not saved by the original proviso, the Committee had agreed to that proviso without the proposed additional words.

Mr. GRAY suggested that he rights of the water companies should be similarly safeguarded.

The CHAIRMAN said that this was unnecessary.

Mr. SAUNDERS pointed out that the water companies were satisfied with the clauses in the Bill.

On the suggestion of Mr. FREEMAN, the second paragraph of the proposed clause was amended by the words "sewer, drain, watercourse, defence" being struck out, so as to maintain the powers of the County Council under another section.

The clause as amended was then approved by the Committee.

The London Electric Supply Corporation Bill was then gone through, and amended in accordance with the decisions of the Committee. The principal alteration made was in clause 4 to omit the two last paragraphs, and insert—"The undertakers shall not purchase or acquire the undertaking of, or associate themselves with, any other Company or person supplying energy under any Licence, Provisional Order, or Special Act, within the administrative county of London, unless the undertakers are authorized by Parliament to do so."

Two new clauses were inserted, as follows:—

(1) The accounts to be rendered by the undertakers under the 9th section of the Principal Act shall be examined and audited from time to time by such competent and impartial person as the Board of Trade shall from time to time appoint; and the remuneration of the auditor shall be such as the Board of Trade shall from time to time direct, and the same and all expenses properly incurred by him in or about the execution of his duties shall be paid by the undertakers on demand in such manner as the Board of Trade from time to time direct, and shall be a debt due from the undertakers to the Crown, and shall be recoverable accordingly with costs. The undertakers shall give to the auditor, his clerks, and assistants, access to such of the books and documents relating to the undertaking as shall be necessary for the purposes of the audit, and shall, when required, furnish to him and them all vouchers and information requisite for such purpose, and shall afford to him and them all facilities for the proper execution of his and their duty. The Board of Trade may from time to time make and vary regulations prescribing the times at and the mode in which such audit shall be made and conducted or otherwise for the purpose of giving effect to the provisions of this section.

(2) Notwithstanding anything herein contained, it shall not be lawful for the undertakers to break up, or interfere with, any bridge or the approaches thereto vested in the County Council or the roadway or footway over the same, except in accordance with plans, sections, and particulars, previously submitted to, and approved in writing by the said Council, or as may be settled by arbitration as herein provided. If within 28 days after the submission of such plans, sections, and particulars to the said Council, with notice in writing requiring them to approve the same, the said Council shall disapprove or fail to approve such plans, sections, and particulars, then such plans, sections, and particulars, shall be referred to an arbitrator to be appointed by the Board of Trade on the application of either the said Council or the undertakers. Such arbitrator shall consider and determine, having regard to the structure and design of the bridge, and to all other circumstances of the case, on what terms and conditions, and in accordance with what plans, sections, and particulars, such crossings should be allowed, and the undertakers shall be bound to comply with, and observe all the terms and conditions imposed and the plans, sections, and particulars approved by such arbitrator.

The other Bills were also gone through, and similar amendments inserted; the Bills, as amended, being subsequently reported to the House.

Legal Intelligence.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL

WEDNESDAY, JULY 17.

(*Before the* MASTER OF THE ROLLS, *and Lords Justices* COTTON *and* LINDLEY.)

THE CORPORATION OF SALFORD *v.* THE GAS-METER COMPANY, LIMITED.

This was an appeal by the plaintiffs from the order of the Divisional Court, affirming the order of Mr. Justice Stephen reversing the order of the Master, for delivery of particulars as to commissions received by Samuel Hunter (see *ante*, p. 19).

Mr. HENN COLLINS, Q.C., and Mr. GOULD appeared for the plaintiffs; Mr. ASQUITH for the defendants.

Mr. HENN COLLINS said the action was brought to recover damages in respect of overcharges made by the defendants to the plaintiffs through a corrupt bargain made between the defendants and Samuel Hunter, whereby Hunter was to receive a commission of 10 per cent. upon all sums paid by the plaintiffs. An order was made, upon a summons taken out by the defendants, that the plaintiffs should give particulars of the dates of the alleged fraudulent dealings, whereupon the plaintiffs took out a summons for discovery of the defendants' books; and Mr. Justice Stephen ordered that the plaintiffs should give particulars before they had inspection of the books, which, of course, they were unable to do, as they could not state, except from the books, the precise time at which, and under what circumstances, the contracts were made. To affirm this ruling would be tantamount to saying: "Until you have proved your fraud, you are not entitled to discover."

Mr. ASQUITH contended that the order was perfectly right. The action was brought alleging fraud; and, without being able to give particulars, the plaintiffs sought to get inspection.

The MASTER of the ROLLS: They give you instances of the contracts.

Mr. ASQUITH: They take every contract entered into between the parties for a period of thirteen years, set out the total price paid, and then claim 10 per cent. upon the amounts.

The MASTER of the ROLLS: The allegation is that you paid 10 per cent. on each occasion.

Mr. ASQUITH: The allegation is that there was a corrupt agreement between the defendants and Hunter; and I am entitled to know whether they allege a specific agreement made at a particular time, or a general agreement covering a series of years, or if all they mean is that, looking at the price, they think they have been overcharged. I am ready to give discovery when they give me particulars of the case made against me.

The MASTER of the ROLLS: They have done that. They say they have been overcharged on every contract.

Mr. ASQUITH said he was entitled to particulars of the agreement which was alleged to have been made with Hunter, and to know who was the other party to the agreement. If such an agreement was made, it must have been with an officer of the defendant Company; and if the plaintiffs had any information in their possession which would verify the statement, they should give it. If they had not such information, the action was a purely speculative one. He had the ordinary right of a defendant, against whom an agreement was alleged in vague terms, to know what the agreement was—whether it was verbal or written, and when and between whom it was made.

Lord Justice COTTON thought the only question was whether the particulars should be given after or before discovery.

Mr. ASQUITH said that was so. The question was really whether the

plaintiffs could ransack his books to obtain information to support a speculative action. A plaintiff was not entitled to discovery until after the defence was put in; and this could not be done until he knew what he had to meet.

THURSDAY, JULY 18.

Mr. ASQUITH, continuing his argument this morning, said the plaintiffs alleged, with or without information in their possession to justify their doing so, that the defendants entered into a fraudulent agreement with Hunter. They assumed to know enough of the agreement to allege that it was an agreement to pay him a bribe at the rate of 10 per cent. on all contracts. That statement was consistent with either of two set of facts—it might either be that they, knowing Hunter was a dishonest person, and having found out that he had cheated them in certain transactions, suspected that he had cheated them in this instance; or it might be that they had definite information of an agreement for payment of the 10 per cent. Whichever might be the true view, he was entitled to more definite particulars before being called upon to put in his defence or give discovery.

The MASTER of the ROLLS said the plaintiffs brought their action charging the defendants with having done that which, if they had done it, was wrong—viz., made contracts through Hunter, whom they knew to be the plaintiffs' agent, and that they had given a commission, or, as it was called by an uglier name, a "bribe," to that agent, so as to destroy the independence with which he ought to have dealt for his principals with the defendants. If the plaintiffs at the commencement made a general charge of that kind, the defendants would have been entitled to exact particulars of the occasion on which the plaintiffs alleged that they had done these things, before anything else was done. But the defendants had obtained those particulars from the plaintiffs. It was not that the plaintiffs had made a general charge, and were then, as had been stated, "fishing" for a cause of action. By the particulars, the cause of action was clearly defined, and the occasions on which the causes of action arose. Then they asked for discovery; and to this the defendants said: "We ought not to give discovery until we have had further particulars." That the Court had jurisdiction to grant discovery before the particulars now insisted on were given, could not be doubted. If this was a fishing application, it was fishing for evidence in support of the cause of action. A person had a right to fish for evidence to prove a cause of action; but he could not fish for a cause of action. The plaintiffs had given particulars, and now asked for leave to fish for evidence; and it was said they could not do so until they had given information. What information? The very information which he was fishing to discover. If the objection were to prevail, it would destroy the whole value of discovery to the plaintiffs, and shut them out at once by saying: "You have defined your cause of action; nevertheless you shall not attempt to discover in my books the evidence in support of that cause of action until you have told me all the particulars which are the very particulars which you want to discover." In his opinion, the thing contradicted itself. Here, what the plaintiffs wished to discover were circumstances which, if they could discover anything, were circumstances within the knowledge of the defendants, and could not be within the knowledge of the plaintiffs. The plaintiffs were asked to state what they did not know, and what they could not know. Then it was said the defendants, being a corporation, ought not to give discovery until they were told the name of their servant who made the agreement; but he knew of no such law. He thought the Judges had overlooked the critical point in the case, and been a great deal too rigid with the plaintiffs; for they practically destroyed the possibility of proving the cause of action on which the case was launched. The discovery ought to be given before the particulars were given, because the discovery was wanted in order to enable the plaintiffs to give the very particulars demanded by the defendants.

Lords Justices COTTON and LINDLEY concurred.

The appeal was allowed, with costs.

PROJECTED ADDITIONAL WATER SUPPLY FOR SKIPTON.—Acting upon a resolution passed at a recent meeting of the Skipton Local Board, the members last Thursday week visited Eastby Gill, for the purpose of inspecting the proposed new source of water supply. An increased supply is urgently required for the township; and the Engineer is expected to report very soon upon the respective merits of the Eastby and Skibeden schemes, and of both combined.

THE MURDER AND ATTEMPTED SUICIDE BY A WATER-WORKS MANAGER.—The unfortunate man Curragh, who recently took the life of an acrobat named Goring, and afterwards attempted to destroy himself, under circumstances which have been already recorded in our columns, was last Tuesday committed for trial on a charge of wilful murder. The prisoner, it will be remembered, was Manager of the Kent Water Company's works at Crayford. There is little doubt that the act of which he stands accused was committed while suffering from monomania.

WESTINGHOUSE ELECTRIC COMPANY, LIMITED.—A Company has been registered under this title, with a capital of £600,000, in £10 shares, "to acquire certain patents, goodwill, business, inventions, machinery, and property of the American Company, known as the Westinghouse Electric Company; to carry on the business of makers and suppliers of, and dealers in electricity, electric power, and light; to create, produce, store, accumulate, supply, hire, and lease electricity, electric power, or other similar agency for any purpose; to acquire all land, estates, factories, personal property, rights, and privileges requisite or convenient for the purposes of the Company, whether from the Westinghouse Electric Company in America or elsewhere." Among the first subscribers is Sir H. W. Tyler, M.P.

NEW STOKING MACHINERY FOR THE ABERDEEN GAS-WORKS.—The members of the Gas Committee of the Aberdeen Town Council at their meeting last Thursday week had a conference with Mr. J. West, of Manchester, whose new stoking machinery is about to be introduced at the gas-works. Lord Provost Henderson presided. Mr. West gave a full and interesting description of the new machinery. He expressed himself thoroughly pleased with the retorts at the works; and having made an examination of the establishment the previous day, he considered the whole place in an admirable state. The Engineer (Mr. A. Smith), he thought, had underestimated the saving which the introduction of the new machinery would effect. Replying to a number of questions, Mr. West said he considered that the gas in Aberdeen was cheaper relatively than in London. As to local authorities taking up the supply of electric lighting, he said that in his experience no electric lighting company had yet paid a legitimate dividend; and he thought that if the light was to be introduced, it should be done by the Corporation who had the management of the gas supply. Mr. West was instructed to prepare and submit an estimate of the cost of the new machinery, to the introduction of which the Council have already agreed.

Miscellaneous News.

EUROPEAN GAS COMPANY, LIMITED.

The Annual General Meeting of this Company was held yesterday week, at the London Offices, 11, Austin Friars, E.C.—Mr. H. MCLAUCHLAN BACKLER in the chair.

The SECRETARY (Mr. W. Williams) read the notice convening the meeting, and also the following report of the Directors and a summary of the accounts:—

The Directors regret to state that the depression of trade in the French provinces has been such as to occasion great difficulty in maintaining the consumption of gas at the same favourable rate as in former years. In fact, the aggregate rate of increase of rental at the seven stations is a fraction under 1 per cent. At Nantes and Rouen, the improvement has been in each case about 4 per cent.; but the other stations have yielded less rental than previously. The Directors hope that this state of affairs will not long continue; but they have some reason to apprehend that the great Paris Exhibition, by drawing to that centre many thousands of visitors, will—during the present year at least—prejudice the interest of provincial towns where the business of this Company is carried on.

Several coal contracts at low prices have still more than a year to run; and during that time, the recent rise in the market will not affect the Company's accounts to a material extent. The cost of coals carbonized last year was nearly 2d. less per ton than in the previous twelve months. Coke does not show any appreciable difference; but in both tar and the products of ammoniacal liquor, there is a manifest improvement.

The Directors are earnestly urging the Managers to do all in their power to promote a more important increase in the consumption by supplying fittings and stoves on hire at a merely nominal rental. Many intensive recuperative burners of the ventilating type may now be seen fitted at the Company's customers, to their entire satisfaction, and affording a light surpassing any other artificial illuminant for permanence, brightness, and facility of manipulation. In addition to such an improvement in the use of gas for lighting purposes, the Directors have constantly under consideration the best means of utilizing it for heating, cooking, motive power, and other purposes. On the 31st of March last, there were 39,099 gas-stoves and 153 gas-engines fixed for the customers of the Company; together yielding a large amount of rental.

The Directors expect that these sources of revenue will be considerably developed in the future, and will fully compensate for any falling off elsewhere. Such being the case, their confidence in the continued prosperity of the Company remains undiminished.

Debentures to the amount of £6950 which came to maturity in the course of the year were duly paid off; and the amount remaining outstanding on the 31st of March was £45,600, the holders of which are invited to claim repayment by anticipation, if convenient to them to do so.

The net profit of the year will admit of a dividend of 26s. per paid-up share, and in the same proportion on the other two series, payable, free of income-tax, on the 1st of August next, less the interim dividend of 10s. per share paid on the 1st of February last.

After providing for this, a balance of £2397 15s. 9d. will remain to be added to the reserve of undivided profits.

Notice has been given that two Directors (Henry Solomon, Esq., and Henry Chaloner Smith, Esq.), and both Auditors (F. J. Road, Esq., and J. Reeson, Esq.), retire from office at this meeting. All being eligible, will be proposed for re-election.

The CHAIRMAN: Gentlemen, in framing the report which has been read to you, we thought it was better to express our regrets in the first instance, because we wished to get over that disagreeable part of our task; and we believed we should be able afterwards, as I flatter myself we have done, to afford you many drops of comfort to compensate for that little regret. We could not help saying something on the subject; because, as we have been accustomed to most flourishing statements, it appeared to us that having only 1 per cent. increase was very far from being as satisfactory as we could wish. But, gentlemen, you know there is no fault on our side in that respect. I will not allude to the political circumstances of the country in which we carry on our business, because they are well known to you; and they had their effect during the past year, as they will have in the current year. The consequence has been a want of confidence in trade amongst business people; and, trade being dull, the consumption of gas has suffered, because people could not afford to burn so much as they did formerly. But this has affected us at only five stations out of the seven. At the other two, which are named in the report—that is, Nantes and Rouen—we have done remarkably well. For these times, 4 per cent., I think, is a very fair increase; and gas companies in the present day rarely experience a larger increase of business than this. I might perhaps add that one of the reasons why we have not done so well is that we make a point now of supplying burners which afford a much better light for a like consumption of gas than those previously in use. Formerly, you know, it was the custom among gas engineers and gas companies in general to confine their attention to the manufacture and distribution of gas—leaving the gas at the meters; and allowing the fitters and the consumers to look after its consumption at the burners. Well, we go farther than that; and we believe most gas companies are now doing the same—that is, we consider it is to the interest of the Company to carry their investigations, and, in fact, their control, right to the point of consumption—whether it be a gasalier or apparatus for affording heat or for cooking. I dare say some people may think we are opposing the interests of the Company in doing so, because we are limiting the quantity of the gas consumed; but that is not our opinion. On the contrary, I think that by providing, and seeing that our consumers are furnished with, the best possible burners, we are assuring the continued supply of our gas, and I believe they well appreciate it. It is true that the consumption of gas may not always be so great as formerly; but we shall distribute more light, and we shall continue to supply it I believe without exciting the opposition and discontent of others who might otherwise betray it towards us. As regards the future, there is one thing which seems to militate against the current year being a favourable one—that is the great exhibition in Paris, which, no doubt, as the Board have stated in the report, will draw immense numbers of people away from the provinces, to say nothing of foreigners, to see it. They go and spend their money in Paris; and consequently the provincial tradespeople suffer by it. They do not do so large a business; and therefore they do not burn so much gas. We are feeling this already to a certain extent, although the Exhibition has only been open for so short a period. But we have some comfort for the present year in this circumstance—and we may claim credit for foresight in what we have done—we made contracts for coals for three years, which have still one year to run. During that period we shall have our coal at a very reasonable rate indeed, which will enable us to tide over this time of crisis. Whether the crisis arise from the exhibition, or from political circumstances, it will help us greatly through the twelve months. Now with regard to fittings, there has been less profit on that business than in the previous year; and for this reason: We are endeavouring, as far as lies in our power, to supply fittings as well as burners at a reasonable rate—not a rate that affords us much profit, but one which will induce people to come to us and take our gas in preference to any other illuminant; and so, carrying on that system, we have reduced the cost of our fittings, and not only that, but we continue to let fittings on hire at a merely nominal rate, which we have found exceedingly successful. It is a great advantage; and gives to people, who otherwise could not afford to pay for fittings, the

opportunity of having them at a small outlay, and of taking the Company's gas. These people, I may say, when they do consume gas, are among our best customers, because they have three, four five, and sometimes ten lights; and they are constant consumers every day and night. We have in our accounts written off largely for the depreciation of fittings placed in this way. You know the moment gas-fittings are fixed, they are merely of nominal value, if gas once passes through them; and really you cannot sell them readily above the value of the metal. We manage our fittings business in this manner, and write off, as I say, largely for their depreciation, so that we may not have a considerable amount of capital appearing in our books for that purpose. This fittings account includes also a number of meters on hire. These are all embraced in one account, as it is not worth while to separate the two. Some years ago I called the attention of the French gas engineers at their congress to the absolute necessity, if we wished to hold our own as suppliers of gas, of ventilation—ventilation either by the gas-fittings themselves, or by ventilating the premises in which the gas is consumed. It takes some time for an idea to fructify; but I am pleased to tell you that the attention of our French colleagues and engineers is thoroughly roused on this subject. At the congress of the Société Technique du Gaz en France which I attended in Paris last month, it was really the staple of the discussions which occurred; and I believe that a great deal will now be done in this direction. I do not know whether there are any architects present; but if there are I do not intend anything personal to them. But I must say that architects in England and in France have done us a great deal of injury by not paying proper attention to the ventilation of premises — not only to gas companies (we cannot expect them to care for us as gas sellers), but to the health of those who live in such premises; because architects do not provide means of ventilation without causing currents of cold air to fall upon the occupants of a room, occasioning inconvenience. I will now pass on to the accounts. The outlay has been small during the year, for the simple reason that, not having done a much larger business, we have not required much new apparatus for extensions. What we needed for renewals, we have charged against the profits. Mainlaying we always have to do to a certain extent. The amount has been small this year, and I do not see any probability of its being larger for some time to come. In regard to investments, you will have observed, as the accounts were read by the Secretary, that they embrace securities of sterling value; and they have been increased during the present year by £21,160; making together £86,442—all available at very short notice, if required. At the present moment, I do not see that we shall have any cause to realize them. Perhaps it may be useful to devote a few minutes to explaining the position of the Company as regards the interest on these investments. I and my predecessors in the chair have been sometimes questioned about our reserve fund. You say to us: "Yes, you have good reserve funds, no doubt; but where is the money?" and the explanation has been that, instead of raising money by calls on the shares, and other means, we have used the sums set aside as a reserve fund for the purpose of extending our business. Well, now that the gas business is not growing at the same rate, the money, instead of being invested in apparatus, bricks, and mortar, comes to us in cash; and we invest it. What are we going to do with this money? I will tell you. We have concessions remaining now for 30 years on the average. This seems a long time; but at the end of that period, we have to yield up our mains to the different municipalities without compensation (unless we renew the concessions from time to time)—that is, our business goes from us. We shall have the works, which may either be purchased by the municipalities, or we may perhaps have to sell them at their mere structural value. This is a remote question, because it will not occur before this average of 30 years—in some cases 17 years; and in others not before 40 years. At the end of the concessions, we must produce to the shareholders, if we do not do so before, the means of paying off the capital of the Company. We must place ourselves in a position to do so; and therefore we must have cash for the purpose. You will see that our redemption account shows that we have £520,000 placed for redemption of a capital of £501,000. This appears unreasonable on the surface. But when we come to see on the other side of the account that we have expended £1,115,725, it shows that this is the amount we have to redeem. We have to redeem what we have spent—not merely the shares we have issued, but the amount actually laid out; and if we fail to do this, the consequence will be that, when we come to pay off the shares, we should pay simply £10 per share to the holders. Then what comes of the high premium that they are paying for the shares. They would have to forfeit that entirely. We are not only justified, but we are compelled to replace in cash, some time or other, all the amount that has been expended on the different works of the Company. The accumulations we make from time to time will serve that purpose. One means of answering that purpose is pointed out in the regulations of the Company. It is either to pay off in cash, or to pay off the shares *pro ratâ* as the money accumulates. Well, we have done something to that effect; and you will observe that we have now £6846 on shares account. Of course, you would ask me, if I were not to explain it, what this means. It means that we have purchased, in the course of the year, 310 shares of the Company in the open market; and that purchase gives us a beginning of a sinking fund to extinguish our capital. We should probably have continued to purchase shares in this way; but they rose in value. And in a small Company like this, when a large purchaser comes in, they must rise; but when we see our opportunity, we shall adopt the same course—that is, buy up by degrees the shares; and we find the means in that way of redeeming the premium as well as the actual amount paid on the shares. Turning from this subject, at the last annual meeting something was said about Boulogne yielding a very small amount of profit. I feel therefore it is well to mention now that the amount of profit has increased. In order that the Boulogne station should be on the same fair footing as the others, we have made this year a slight alteration in the amount of interest charged against it. It does not affect the profit in the least, because what does or does not appear under the head of one station is compensated for in the interest account at the foot. We thought it better to take Boulogne as having a part of the capital not remunerative; and therefore we have allowed that station very favourable terms as regards interest, compared with the other works—that is, we have only debited it with 4 per cent. instead of 5 per cent. as in the other cases. I should now like to say a little about the competition with which we are threatened. In the first place, as regards our most brilliant enemy, the electric light. What progress is it making? It is making some progress, and no doubt great progress, in many cities. We are threatened with it here in London very shortly. Paris also is to have several central stations; but with all that, do we find that there is any progress in the profit of those undertakings which have already been established? I do not know of a single concern which is yielding such a profit as a gas company would expect to earn out of its business. I have seen a great deal of electric lighting both in England and elsewhere; and I have noticed in several places abroad that where the electric light was once exclusively used, it is only now employed in the front of the shops, and gas has been restored in the back part of the premises, both as being much cheaper, and as affording the heat which is absolutely necessary in winter, unless some other fuel is provided. Now, gentlemen, it is a reproach which is often addressed to us, that gas produces too much heat. Well I confess it does produce too much heat; but it has been my desire and the object of my efforts to encourage ventilation, as I said before, by all means at my command. But electricity does produce heat of a different kind. It is through too much heat that many people have burnt their fingers in the investments or rather the speculations they have made in that way; and I do not see there is much amendment in that respect. Where profit has been made to any considerable extent by electric companies, it has arisen, not from the actual supply of the light, but from the fittings which have been manufactured and sold to other parties. That at all events is my impression. Reverting again to my personal experience, I have noticed this year, in a tour of inspection I made round the stations of this Company, that electricity is being introduced in some places; but at a Casino in one of the principal marine resorts of France, where it was introduced a few years ago, it has this year been discontinued. At all events for the present this Casino remains lighted exclusively by gas, owing to the want of steadiness and stability of the electric light, which, it appears, could not be overcome. At another place in France, I found that a central station for electric lighting had been established in one of the towns that this Company partially lights; and the electric light has not taken a single one of our customers, although it had done so in the case of the other Company. I noticed that two of the principal establishments that were lighted by electricity at the outset, had reverted to gas, finding the electric light unsuitable to their business. They were wholesale tailors. I do not think the electric light was doing much damage there. With regard to other competitors, we have water gas. But it seems to me almost like "killing the slain" to say much about that; for I have been told to-day that the premium in the case of one of the companies, which had gone up to £20, is now £1. It would interest you perhaps if I were to say something of my connection with what occurred some 33 years ago. I was then engaged, in this Company's interests, to oppose an attempt made at Nantes to deprive us of our concession. It was pretended that the concession only extended to supplying gas for lighting, and that the town had a right to give a concession for supplying gas for heating purposes to any other gas company. Several projects were soon on foot; and one of them was for water gas, and another for peat gas. I went carefully into the matter; we engaged the best engineering talent in France and England; and we succeeded in defending our interests effectually. I was looking over my notes, in respect to this matter, a few days ago. They were very copious, and have refreshed my memory; so that I will give you a few of the results. With regard to water gas, you know there is really no illuminating power in it; and that must be provided in some way. If this gas is enriched by (say) cannel gas, or by any other composition of carbon, it will give some illuminating power. The enricher has to be mixed with the poor, thin gas—which alone can be produced from water; and it forms then a mechanical mixture, and not a chemical compound. At equal pressure the two will travel at different velocities. Supposing we were to manufacture water gas here in the heart of the City, and we were to enrich it by some means, the result would be that it would be similar to a thin man and a stout one. You know very well that a thin man can generally run faster than a stout man. Well, manufacturing water gas here in the City, the result would be exactly the same as in the simile which I am putting forth. The thin man would get to Westminster so much sooner than his companion who left at the same time, but who would be wearily trudging along Fleet Street and the Strand, while his friend would be at Westminster. It would be similar with water gas. The gas would be of totally different illuminating power at various stages. Now, it is said that incandescent gas-burners can be used in combination with this very weak gas. We have heard of the Welsbach, the platinum, and the magnesium burners. But, so far as I can learn, there is not one of these that can be generally used with advantage by consumers of water gas. Then there is another objection to water gas, and that is the carbonic oxide which forms such a large portion of its constituent parts. This is so poisonous that, if it accumulate from leakage or otherwise, it will have the effect in a very short time, of causing the death of anyone who may be so unfortunate as to inhale it. This has been found of such frequent occurrence in America, that water gas has been forbidden in many instances. All things considered—taking these facts into account, and perhaps many others that might be mentioned—we need not feel the least uneasiness about this gas, unless indeed we have been so ill-advised as, in a weak moment, to take shares in a water gas company, and then we know how to improve our position by getting rid of them as soon as we possibly can. With regard to peat gas, that was one of the things that was opposed to us in the town I have been alluding to; and also gas made from grape-skins. Perhaps someone will take advantage of this idea, and float a grape-skin gas company (laughter); and it would be just as likely to succeed as many other things that have been started recently. I will now take a short review of our position. We find our concessions have an average of 30 years to run. We have 433,000 burners, of which an equivalent to 134,000 are used for other purposes than actual lighting—for heating, engines, or other purposes. We have provided for the depreciation of all our material—largely I may say; but I hope not too largely, because that would be unfair to the present proprietors. We have a good reserve for equalizing dividends, if such a course be required. We have reduced the debentures to £44,100; having paid off £1500 a few days ago. We have invested in cash £86,442, which is immediately available. Now I think I may fairly say that there are few undertakings, if any, in a more favourable position; and whatever may occur to this Company, whatever opposition it may meet with, I feel convinced that, with such advantages in our favour, we shall be able to fight all our competitors with much stronger armour than they can possibly possess. I am, therefore, perfectly at ease with regard to the future of this Company. Before proposing the first resolution, I will just refer to a conversation that took place at the last meeting as to the continuance of the half-yearly meetings. In point of fact, there were present at the meeting only 18 outside proprietors. You know it is not a statutory meeting—not a meeting that the Directors are bound to hold by the regulations of the Company; and it is held merely to keep the shareholders *au courant* of what is going on. I do not think it is worth the trouble and the work in the office to keep up that half-yearly meeting. What I propose to do, there having been no objection since the last meeting, and only one gentleman then raised a slight opposition—which I hope he will not insist upon now—is to abandon the meeting. We do not make it a Board matter at all. It is merely our opinion as individual shareholders. We can give very little information at the January meeting, because there are then no accounts, and the interim dividend is not dependent upon it. Under these circumstances, I trust it will not be necessary more than to merely ask the shareholders to hold up their hands at the close of this meeting, when I shall propose an informal resolution on the subject. I now move the first resolution—"That the report of the Directors and the statement of accounts now read be received and adopted."

Mr. H. SOLOMON seconded the motion, which was agreed to without comment.

On the motion of the CHAIRMAN, seconded by Mr. E. F. WHITE, the dividend recommended by the Directors in the report was declared.

The Directors retiring by rotation (Messrs. H. Solomon and H. Chaloner Smith) were re-elected, on the motion of the CHAIRMAN, seconded respectively by Mr. F. J. ROAN and Mr. WHITE.

On the proposition of Mr. HARVEY, seconded by Mr. ROGERS, the Auditors (Messrs. F. J. Roan and J. Reeson) were re-appointed.

A vote of thanks was then passed to the officers of the Company for their services during the year.

The SECRETARY having suitably responded,

The CHAIRMAN moved—"That, seeing the small number of shareholders who attend the half-yearly meetings held in January, such meetings be discontinued in future."

Mr. BEARD expressed the opinion that it would be a mistake to dispense with the meeting, as it was only twice a year they came in touch with the Directors.

Mr. R. HESKETH JONES, in seconding the motion, said he thought it would be expected that he should say a few words on this subject. At the last meeting, the question of the desirability or not of having a half-yearly meeting was discussed; and he then ventured to say that it was desirable the rule should be continued. As it was not the opinion of the Directors that such a course was necessary, and it was inconvenient in the office; he personally had such full confidence in the Board that he bowed to their decision, although it was a great pleasure to him to be present every half year to hear their Chairman's lucid statements.

The motion was then carried.

The customary vote of thanks having been accorded to the Chairman and Directors, the proceedings concluded.

PARA GAS COMPANY, LIMITED.

The accounts of this Company for the half year ending March 31 last have been issued; and the Directors, in their report accompanying them, state that the revenue for the six months has largely fallen away, owing principally to the reduction in the amounts received for private lighting. Under clause 20 of the concession, the Company are required to charge private consumers the same price for gas as that charged at Rio de Janeiro. This has always been understood to allude to the price charged by the Company which formerly lighted that capital. Since, however, the new Belgian Company have had the contract, the price of gas has been reduced by one-third, and the Pará Directors have been compelled by the President of the Province to make a like reduction. It is, of course, hoped that this great diminution in price may lead to a larger consumption, and that the Company may thus in time be reimbursed for the loss immediately sustained; but as yet the period during which the reduction has been in force has been too short to produce any marked difference in consumption. The average freight on coals shipped to Pará for the half year under consideration was largely in excess of that in the corresponding period in the previous financial year. Fines are still inflicted by the Provincial Government, but not to such an extent as heretofore. Notwithstanding the untiring exertions of the Manager (Mr. J. Gibson Newbigging), no satisfactory arrangement has been come to with respect to the long-outstanding accounts due to the Company from the Government; and at the present time the public lighting for November and December, 1887, has not been paid for. The amount due by the Provincial and Imperial Governments at the date of closing the accounts was the equivalent of £10,547 15s. 8d., as against the equivalent of £8390 0s. 11d. on the 30th of September last, and £9468 15s. 11d. on March 31, 1888. A profit was earned during the half year sufficient for a dividend at the rate of 4 per cent. per annum; but until the Government pay the money so long overdue (and on which they refuse to allow any interest), no division can be made. The Directors, therefore, in accordance with the powers vested in them, and after due and careful consideration, have resolved—"That a dividend at the rate of 4 per cent. per annum for the half year ending March 31, 1889, be and is hereby declared, such dividend to be payable as soon as the necessary funds can be obtained from Government authorities." Due notice will be given by the Directors when the dividend warrants are forwarded.

STOKE-UPON-TRENT CORPORATION GAS SUPPLY.

THE TRANSACTIONS OF THE GAS COMMITTEE.

At the Meeting of the Stoke-upon-Trent Town Council last Thursday, Mr. Robinson, in accordance with notice, moved the following resolution—"That the transactions of the Gas Committee be submitted to the Council every month for confirmation or otherwise, in pursuance of the power contained in the 32nd section of the Stoke and Fenton Gas Act, 1883." He said it appeared very strange to him that when the Stoke Corporation obtained control of the gas-works, this control was not vested in the hands of the entire Corporation, in the same way as the sewage-works and other property belonging to the Corporation. Instead of this, the control of the gas undertaking was in the hands of a Committee, consisting of nine members, who met in secret, and whose transactions were never submitted to the Council. He pointed out that in the county of Stafford there were 13 instances where the gas-works were in the hands of the Corporation, and in every instance the transactions of the Gas Committee were submitted to the general meeting of the Corporation. It was extraordinary to him that it was not so at Stoke. Mr. Sale seconded the resolution. Mr. Acres spoke of the excellent management displayed by the Gas Committee, and submitted that there was no ground for complaint against the Committee, whose successful management of the gas-works was, he said, pre-eminent, and the envy of the neighbouring towns. He thought it was better to let well alone. Alderman Leason then proceeded to defend the course adopted when the Stoke Corporation first took over the gas-works. If the Council considered the amount of profit made since the gas-works came into the possession of the Corporation, he thought a great majority would come to the conclusion that the grievance which Mr. Robinson had brought before them was more one of sentiment than realistic. Alderman Leason proceeded to give details of the profits made by, and the progress of the gas-works while in the hands of the Gas Committee; and concluded by moving an amendment to the effect that, considering the wide experience of the Committee, and the large profits which they had realized, it was not advisable to make any alteration in the conduct of the gas undertaking. Mr. Tomlinson seconded the amendment. Mr. Sale said no one questioned the ability with which the Committee had managed the gas-works, or the success which had attended their efforts; therefore he did not see why the Committee objected to their transactions being brought before the Council. In reply, Mr. Robinson disclaimed any intention of reflecting on the Committee, but contended that not a single argument had been adduced why their transactions should not come before the Council. If they did, it could not possibly be detrimental to the successful working of the gas undertaking. The amendment was carried by 14 votes to 5.

THE LAWRENCE AUTOMATIC GAS COMPANY.

The First Half-Yearly Meeting of this Company was held at Winchester House, E.C., last Wednesday—Mr. C. H. M. BOSMAN in the chair.

The SECRETARY (Mr. W. Tudor Johns) having read the notice convening the meeting,

The CHAIRMAN expressed his disappointment at having to lay before the shareholders an unfavourable report; but the Company had, he said, met with difficulties which they once thought were insurmountable. He believed they had now overcome those difficulties, and looked forward to presenting something more cheering in the nature of a report the next time he had the pleasure of meeting them. He moved the adoption of the report.

Mr. KAYE seconded the motion.

Colonel MARTINDALE confessed that he was not satisfied with the information put before the meeting. He could quite understand that, in the interests of the Company, it might not be practicable for the Chairman to give them any great amount of detail; but in the report they were asked to adopt, there was absolutely no detail at all. They were told that a subsidiary Company had been formed, and that a *modus vivendi* had been found. But they were not told anything about that *modus vivendi*—whether or not it was likely to be satisfactory to the shareholders. They were told that the first machine did not work, and they had got a new one. Having read the report, and listened to the few and simple words the Chairman had been good enough to address to them, he was going away no wiser than he came.

The CHAIRMAN, in reply, said it would not be in the interests of the Company to give any details as to the two agreements; but any shareholder would be supplied with information gratis and *ad lib.* if he would call at the office of the Company.

A SHAREHOLDER asked how many shares Mr. Lawrence held now; and how it was the Company came to buy from him, for a large amount, a machine that would not work.

The CHAIRMAN explained that Mr. Lawrence only held 100 shares; and that they bought the machine on the report of the best experts they could get. Answering some remarks which had been made as to the preliminary expenses of the Company, he said that although they had been somewhat large, it must be remembered that they included charges for certain outlays which would not occur in the future. The Directors had taken absolutely nothing during the eighteen months that the Company had been in existence; and they did not intend to take a single penny till the Company was in a position to pay a dividend.

The SHAREHOLDER: Is Mr. Lawrence still on the Board?

The CHAIRMAN: Yes; his name is still on the Board, but he has not attended for the last six months.

The SHAREHOLDER remarked that it would be better for the Company if he were removed.

After some further conversation, the report and accounts were adopted.

PRESENTATION TO MR. JOHN ROMANS.

On Saturday, the 13th inst., a large gathering of the friends of Mr. John Romans, C.E., of Edinburgh, took place in the Royal Hotel in that city, for the purpose of presenting him with a testimonial on the occasion of his elevation to the Commission of Peace. The name of Mr. Romans will be familiar to many of our readers, with some of whom he is personally acquainted; having been for a considerable time a member of the gas profession. He joined the staff of the Commercial Gas Company in 1846, and left their service in 1851 to take the appointment of Engineer and Secretary of the Devonport Gas Company, which he held for many years. Having returned to Scotland, chiefly with the view of looking after the family patrimony of Newton Grange, Mid-Lothian, he practised as a Consulting Gas Engineer in Edinburgh, in association with his son, an exporter of cannel and other gas and water materials. Shortly after his return, he entered the Edinburgh Town Council. Mr. Romans has always taken a keen interest in politics, and is the Vice-Chairman of the Scottish Home Rule Association. It was at the hands of the Lord Lieutenant of Mid-Lothian (the Earl of Rosebery) that he received the honour of being made a Justice of the Peace; and it was to testify their approval of the selection and their esteem for him as a citizen and a friend, that the testimonial was presented by the subscribers, among whom were many gentlemen connected with the gas profession, whose acquaintanceship with Mr. Romans extended over a period of 40 years. It consisted of a half-length portrait of himself, and a valuable silver salver for Mrs. Romans. The presentation was preceded by a banquet—Mr. J. Wilson, ex-M.P., in the chair. In proposing "The Health of Mr. Romans," the Chairman said the object of the gathering was to give tangible expression to their esteem for one whom they had known for many years, and who had become endeared to them by his private worth and public service. In connection with the latter, he referred specially to the many improvements advocated by Mr. Romans; including the acquisition by the Corporation of the gas and water undertakings. At the close of the Chairman's remarks, the portrait was unveiled amidst applause. Mr. Romans, in reply, said the characteristic of his life had been love of country; and he should continue to advocate a just recognition of Scotland's nationality, co-equal with that of England and Ireland, in all Imperial affairs. He believed this to be the only just and sure way of securing a lasting union between the three kingdoms. He concluded by thanking the subscribers to the testimonial, especially those present and those who had travelled great distances to be there. Mr. C. Waddie then presented Mrs. Romans with a very handsome and beautifully engraved silver salver; adding a few complimentary remarks expressive of the appreciation in which her hospitable character is held. Mr. Duncan P. Romans having returned thanks for his mother, various other toasts were duly honoured, and the proceedings closed with a vote of thanks to the Chairman. There were about 70 ladies and gentlemen present.

REDUCTION IN PRICE.—The *Mansfield Improvement Commissioners* have decided, on the recommendation of the Gas Committee, to reduce the price of gas 3d. per 1000 cubic feet as from the 1st inst.

NEW GAS-WORKS FOR BURLEY-IN-WHARFEDALE.—Since the last meeting of the Burley-in-Wharfedale Local Board, the Sub-Committee appointed for the purpose have succeeded in securing a suitable site for the proposed new gas-works. Preparations will now be made for the erection of the works without delay.

EXTENSIONS AT THE RHYMNEY GAS-WORKS.—The Directors of the Rhymney Gas Company have decided, upon the recommendation of their Engineer and Manager (Mr. T. Acland), to put up a new station meter, and separate governors for the districts of Rhymney and Pontlottyn. These appliances, with the necessary valves and connections, are being supplied by Messrs. W. and B. Cowan. When the work is completed, a considerable improvement will be effected in the pressure over the entire area of supply.

ANNUAL DINNER OF THE YORK GAS COMPANY'S WORKMEN.

Mr. C. Sellers on the Prospects of the Gas Industry.

The Annual Dinner of the *employés* of the York Gas Company took place on Saturday, the 13th inst., at Mr. Barton's Restaurant, Scarborough—the chair being occupied by Mr. C. Sellers, the Company's Secretary and Manager. After dinner, the usual loyal toasts having been duly honoured, the Chairman proposed what he said he might call the toast of the evening—"Prosperity to the York United Gaslight Company;" and therefore he need not ask them to drink it with enthusiasm. The present position of the Company was highly satisfactory, and its future well assured. They had a good Board of Directors; and he was proud to say the Directors had a good staff of workmen to match. The aim of the Board was to govern justly—justly to the public and justly to the workmen; and therefore the Board were entitled to the best efforts and the most loyal conduct of every man in their employ. He had said that the future of the Company was well assured; and he said this regardless of the varied and increasing competition to which the gas industry was subjected. They had fought with dips, both long and short, and they had snuffed them out. They had fought with oil in every conceivable form, and oil had had to knock under. They had also fought with the electric light. Last of all, they were said to be on the eve of fighting with water gas. In fact, borrowing the language of Tennyson's "Charge of the Light Brigade," they had

"Cannon to right of them, cannon to left of them."

and they had all

"Volley'd and thunder'd."

But he had no hesitation in saying that the gas industry stood that day as able to hold its own as ever it did; and so far it had not even been "winged." He did not wish to disparage the electric light, and he was ready to admit that it was one of the grandest scientific accomplishments of the age; but it had a field of its own, and there was plenty of room for it. Still according to the best-known authorities, it could not commercially compete with coal gas. As to the last competitor—water gas—which had lately "volley'd and thunder'd," it might, for all practical purposes, be well expressed by Shakespeare's quotation; it was

"Full of sound and fury, signifying nothing."

It was true that water gas, under the influences of financiers, had been written up by certain newspapers; but it was well known that many newspapers could be bought and sold as they bought and sold old rags, to write up or write down anything or anybody. Some of their competitors had been introduced to the world by ordinary mortals; but modern water gas had behind it a veritable Samson in the person of Mr. Samson Fox. He would not say that he was as strong a man as the Samson of old; still there was some similarity. The Samson of old was said to have slain three thousand men with the jawbone of an ass—which some of his audience might think was rather a big day's work, and a toughish job. But whilst it could not be said that the water gas Samson had actually slain anybody, he had put into the hands of prospectus-mongers another "jawbone of an ass," by which thousands had been bled, and bled to such an extent that, as it was proverbial that a man once burnt was twice shy of fire, so, in his (the Chairman's) opinion, water gas shareholders might be trusted to avoid water for the rest of their lives. What they, as coal gas men, had to do was to do their best to meet the ever-increasing uses of the article they made, and to make that article as good and as cheap as possible. One of the uses of gas which the public needed better to understand was its use as fuel for cooking, warming, and trade purposes; and when once the public saw its great economy, comfort, and cleanliness over the wasteful and laborious use of coal in the household and in the workshop, they would not need to be told twice that the future fuel in our cities and towns would more and more be composed of coal gas and its sister coke. Mr. Sellers's remarks were received with applause. Mr. Leaf proposed—"The Health of the Directors," who had provided the dinner and granted the day's outing. The toast was heartily cheered. The health of the Manager's mother (Mrs. Sellers) who is very popular with the workmen, was also, as usual, honoured with three hearty rounds of hurrahs; and after compliments had been paid to Mr. Barton for the manner in which the dinner had been served, the company separated.

Electric Lighting at Barnet.—In the minutes of the Lighting Committee presented at the meeting of the Barnet Local Board last Tuesday, it was reported that they had inspected the electric lighting station, and were informed that the power now at the works was greatly in excess of the power requisite for lighting the town—the force at command being able to supply 200 lights of 32-candle power. They were of opinion that since this was so, Mr. Joel should be called upon to supply lamps of uniform 32-candle power; that accumulators for the junction lamps should be fixed at the earliest possible moment; and that Mr. Joel should be asked to name a time when the Board might expect to find them in proper working order. They also considered that the time had now arrived when the gas-lamp posts should be removed. In the course of the discussion which followed the reading of the report, it was pointed out that more lamps ought to be provided before the winter, which, although the electric light was introduced to save time and money, will involve (said one of the members) a "lot" of expenditure to the ratepayers. The report was adopted. In an editorial, dealing with the proceedings at this meeting, one of the local papers observes: "Members of the Board seem to be entirely oblivious of the recent failures of the light; and it was certainly a strange commentary upon their self-congratulation that, while they were thus engaged, the whole of the streets were in darkness—the electric light having suddenly refused to act at all."

The Brighton Town Council and Electric Lighting.—In the minutes of the Gas Committee presented at the meeting of the Brighton Town Council last Thursday occurred the following resolution:—"That the Town Clerk do request Mr. Shoolbred, C.E., Electrical Engineer, to meet the Committee on an early day with a view to his advising the Corporation as to the most advisable course to pursue in order to provide a supply of electricity for the borough, whilst retaining for the Corporation complete control over the laying of mains, and all work which would be executed in the public streets." Dr. Ewart moved the confirmation of the minutes, and said the members of the Council would see the Committee had entered on an extensive enterprise. They would recollect that after the inquiry, which was held during April, the Board of Trade took some time to come to a conclusion as to whether or not a Provisional Order should be granted to the Brighton Electric Light Company. Correspondence took place between the Mayor and the Board of Trade; and the ultimate result was that as the Council had decided to supervise the electric lighting of the town, the Board did not see how they could dispense with the consent of the town in granting a Provisional Order for the Brighton Electric Light Company. Therefore they were in this position: They were obliged to undertake this business within two years, either by themselves or by letting it to others, and yet maintaining complete supervision with regard to the streets. The minutes were confirmed.

METROPOLIS WATER SUPPLY.

The returns furnished to the Registrar-General by the London Water Companies show that the average quantity of water supplied daily to the Metropolis during the past month was 180,877,584 gallons, against 175,570,123 gallons in 1888. The number of houses served last month was 751,877, or 241 gallons per house, and 30·8 gallons per head of the population; as compared with 735,616 houses and 30·4 gallons per head during June, 1888. Of the entire bulk of water sent out last month, 91,461,781 gallons were drawn from the Thames, and 89,415,803 gallons from the Lea and other sources.

In his report to the Registrar-General on the quality of the Metropolitan Water Supply last month, Dr. Edward Frankland remarks: "Taking the average amount of organic impurity contained in a given volume of the Kent Company's water during the nine years ending December, 1876, as unity, the proportional amount contained in an equal volume of water supplied by each of the Metropolitan Water Companies and by the Tottenham Local Board of Health was: Kent, 0·8; Tottenham, 1·0; Colne Valley, 1·2; Grand Junction, 1·5; New River, 1·6; Lambeth, 2·0; West Middlesex, 2·6; East London, 2·7; Southwark, 3·4; and Chelsea, 3·8. The water drawn from the Thames by the Chelsea, West Middlesex, and Southwark Companies was inferior in quality to that delivered in May; but the Lambeth Company's water was superior, whilst that sent out by the Grand Junction Company contained, for river water, a remarkably small proportion of organic matter—surpassing in this respect even the New River Company's supply. All the Thames waters were efficiently filtered. The water abstracted chiefly from the River Lea by the New River and East London Companies was efficiently filtered. The New River Company's supply was superior, whilst that of the East London Company was inferior to the water delivered by these Companies respectively in May. The deep-well waters of the Kent and Colne Valley Companies and of the Tottenham Local Board of Health were, as usual, of a high degree of organic purity. The Colne Valley Company's water was softened before delivery, and was thus rendered suitable for washing. These waters require no filtration. They were clear and bright."

Messrs. Crookes, Odling, and Tidy, in the course of their report to the Official Water Examiner for the Metropolis (General A. de Courcy Scott) on the quality of the daily samples taken of the water supplied to London in June, say: "During the past month the progressive increase in degree of freedom from organic matter—manifested by the water supply during the first five months of the year successively, was not found to be sustained; but there was, on the contrary, a retrogression to about the degree recorded as prevailing a month or two back. Thus, taking the Thames-derived water for comparison, the mean proportion of organic carbon present in 100,000 parts of the water, during each of the first six months of the year respectively, was found to be as set forth below—the mean proportion of 0·144 grain of organic carbon observed during the month of May corresponding, as nearly as may be, to about a quarter of a grain of organic matter per gallon:—January, 0·170; February, 0·161; March, 0·161; April, 0·154; May, 0·144; June, 0·157. A like appreciable, though not important, retrogression was observable in respect of the degree of colour-tint of the water, and of the amount of oxygen required to oxidize the organic matter present; and was noticeable alike in the supply furnished by all the Companies, whether taking their supply from the Thames or the Lea."

SALE OF AN ADVENTURERS' SHARE IN THE NEW RIVER COMPANY.

What the Auctioneer (Mr. Bousfield, of Messrs. Edwin Fox and Bousfield) very correctly described as an "unprecedented auction" took place last Wednesday, at the Mart, Tokenhouse Yard. Never before since Hugh Myddelton's original undertaking was completed in 1613, in the reign of James I., has "one entire and undivided share in the Adventurers' moiety of the estates and interests in the New River" been put up to the highest bidder. The room at the Mart in which on previous occasions Messrs. Fox and Bousfield have had the honour of submitting to public competition portions of these shares was crowded with gentlemen—not, however, all eager to compete for the share, but who were more or less interested in the fortunes of the New River Company. The Auctioneer opened the proceedings with a brief reference to the particulars. Such a unique sale as the present, he said, had not occurred during the three centuries the New River had been in existence; and therefore he thought he was justified in describing it in the particulars as an "unprecedented auction." The dividend in respect of this share for the year ending Christmas last was £2610; but the value of the share was greatly increased by the reversionary interest which it carried to "important future accretions." There was a clear title in connection with this share of 52 years. They had been solicited to sell this share by private contract; but having taken time to consider, they had determined that the property should go to public auction, and so had refused the offers which had been made. He would not occupy time by referring to the historical facts which were set out briefly in the particulars; but he might say that in the past 20 years the income of the Company had doubled. In 1888 the income was £511,356; and in 1869, £268,288. At a latter stage of the sale, he referred to the Dobbs agitation and to the passing of Mr. Torrens's Act; pointing out that, in the case of the New River, directly these gentlemen had finished their work, instead of the revenue of the Company diminishing, it increased. Whatever legislation was proposed in regard to the Water Companies, instead of injuring them, it appeared to "bless" them. He also urged investors not to be afraid of the Purchase Bill of the London County Council. That body devoted itself chiefly to considering the question of erecting new offices, giving public dinners, and so on; and moreover, before very long, they would have to face another election. Having invited offers for the share, £80,000 was bid, followed by £85,000, and then £90,000. By £1000 bids, £100,000 was reached. Then by from £100, to £400 bids, the price was run up to £102,600. Here there was a pause, and Mr. Bousfield remarked that they had been privately offered £102,000 for the share before going to any expense in the matter; and he "confidentially" mentioned that the odd £600 now offered would hardly satisfy himself and his friend Mr. Frere (of Messrs. Frere, Forster, and Co., the Solicitors to the Vendor). He calculated on obtaining at least £115,000 before he finished. The biddings were then resumed, and £106,000 was soon reached, at which figure one gentleman, who had been actively competing, left the room. As fast as the Auctioneer could count, the biddings, by £100 at a time, ran up, amidst much excitement, to £122,000. The bidding was then apparently left to three parties, and was carried up to £122,800, at which price the share was knocked down, in the midst of much applause, to Mr. W. J. Lancaster, the Secretary of the Prudential Assurance Company.

Local Government Board Inquiry at Sketty.—Last Tuesday, Mr. T. Codrington, one of the Local Government Board Inspectors, held an inquiry at Sketty, to consider the application of the Rural Sanitary Authority to borrow £8000 for the purpose of constructing new waterworks at Cwm Llowydd.

THE BOARD OF TRADE AND ELECTRIC LIGHTING SCHEMES.

Proceedings in the Past Year.

The Board of Trade have issued a report respecting the applications made to them during the past year under the Electric Lighting Acts, 1882 and 1888, and their proceedings thereon. Altogether, 17 applications were received for Provisional Orders, by the following Companies:—Brighton and Hove Electric Light Company, Limited; Chamberlain and Hookham, Messrs. (for Birmingham); Chelsea Electricity Supply Company, Limited (two Orders); Electrical Power Storeage Company, Limited; House-to-House Electric Light Supply Company, Limited; Kensington and Knightsbridge Electric Lighting Company, Limited; Liverpool Electric Supply Company, Limited; London Electric Supply Corporation, Limited; Metropolitan Electric Supply Company, Limited (four Orders); Swansea Corporation; Westminster Electric Supply Corporation, Limited. Of the 17 applications received, 13 related to districts within the Metropolitan area. Some of them comprised very extensive areas; while in several cases the same district was included in the applications of two or more Companies—no less than six Companies seeking to obtain powers within some portions of the parish of Kensington. It thus became necessary for the Board to determine the general principles on which they would proceed, and in particular to decide as to the following important questions:—

(1) The size of the area to be allotted to each Company; and (2) whether concurrent powers should be granted to two or more Companies within the same area. A large number of objections and suggestions were received from the various local authorities interested, and different views were taken by them as to the above-mentioned points.

As soon as the Board had received the observations of the promoters on the objections, they appointed Major Marindin, C.M.G., R.E., one of their Inspectors, to hold a local inquiry, which was opened at the Westminster Town Hall on the 3rd of April, and lasted for 18 days.* In addition to the applications for Provisional Orders, Major Marindin was directed to consider at the inquiry certain applications for Licences which had been received by the Board, as well as a Bill promoted by the Metropolitan Electric Supply Company, Limited, in respect of the parishes of St. James, Westminster, and St. Martin-in-the-Fields. At this inquiry the various promoters and most of the local authorities, were represented; and the report made by Major Marindin dealt at considerable length with the numerous considerations urged by them.

In settling the conditions under which the Orders should be granted, the Board of Trade were anxious to receive the assistance of the London County Council. With this view, they forwarded a copy of the report to the Council, with a letter explaining the general principles on which they proposed to proceed, and, later on, a copy of a Model Order which had been prepared for general adoption in the Metropolis. The Council appointed a Committee to confer with the Board; and the Department express their indebtedness to them for valuable assistance afforded in the matter. The Council generally endorsed the principles upon which the Board proposed to act, though they suggested amendments and additions, many of which were adopted. Some of the alterations, however, which proposed to extend the jurisdiction of the Council, or to transfer to it duties entrusted by Parliament to the Vestries or District Boards as the local authorities, the Board were unable to concur in. They considered that such substantive changes in the existing law should not be effected by a Provisional Order, but, if necessary, should be carried out by an Act of Parliament of general application, after full discussion.

The manner in which the various applications were dealt with, and the areas which it was decided to allot to the different Companies, are fully detailed In settling these areas, the Board were anxious to give effect, as far as possible, to the wishes of the various local authorities. But they were obliged to consider the matter as affecting the Metropolis as a whole; and they regret that, in some instances, it was found impossible to obtain the full concurrence of the local authority to their proposals. Where, however, the Board granted an Order contrary to the wishes of the local authority, the matter would be the subject of a special report to Parliament, in accordance with the provisions of the Electric Lighting Act, 1888.

Of the four applications which did not affect the Metropolis—three *i.e.*, those relating to Birmingham, Liverpool, and Swansea—were granted, and a Bill to confirm them was introduced into the House of Commons on the 3rd of June. The application for the Birmingham Order originally included the whole of the city. The area in the Order as granted was, however, restricted to a district in the centre of the city, at the request of the Local Authority. The remaining application was made by the Brighton and Hove Electric Lighting Company, who were already supplying electricity in the district, without statutory authority, by means of overhead wires. The application was strongly opposed by the Corporation of Brighton and the Hove Commissioners, the former of whom obtained a Provisional Order in 1883. As the Board received an assurance from the Corporation that they would commence operations under this Order, probably within one year, and certainly within two years from the present time, they did not consider they were justified in dispensing with the consent of the Local Authority, and declined to proceed with the application.

The Order granted by the Board last session to the South Metropolitan Electric Supply Company, Limited, was not confirmed by Parliament, in consequence of the late period at which the Bill to confirm it was introduced.

Applications for Licences were received from the Chelsea Electricity Supply Company, Limited, the House-to-House Electric Light Supply Company, Limited (three Licences), the Newcastle and District Electric Lighting Company, Limited, the Newcastle-upon-Tyne Electric Supply Company, Limited, and the Southampton Electric Light and Power Company, Limited. With the exception of two of the Licences applied for by the House-to-House Company (for the parishes of St. Martin-in-the-Fields and St. George-the-Martyr, Southwark, and the district of the St. Saviour's Board of Works, which are still under consideration), the Board decided to entertain all these applications; and they are now being proceeded with. The applications of the House-to-House Company, and the Chelsea Company in respect of the parish of St. Mary Abbotts, Kensington, comprised the districts allotted to the Companies under the Provisional Orders before referred to, and were applied for in order to enable the undertakers to commence operations before the Orders were granted.

Of the Licences referred to in the last report (a summary of which was given in the Journal for July 24, 1888, p. 173), those relating to the parishes of St. Margaret, Westminster, St. James, Westminster, and the City of Dublin, were granted by the Board. The first of these applications originally included a portion of the parish of St. Mary Abbotts, Kensington, as well as a portion of St. Margaret, Westminster; but as the Kensington Vestry refused their consent, the Licence was granted for the portion of the parish of St. Margaret only. Subsequently, the consent of the Kensington Vestry was obtained, and an additional Licence was issued for an area in that parish. The Wimbledon Licence was settled on behalf of the Board, and forwarded to the promoters (the Wimbledon Local Board), who are still considering it.

Section 4 of the Electric Lighting Act, 1888, provides that the Board of Trade may, by notice served upon the owners or users of electric lines or works coming under the section, require that such electric lines or works shall be continued and used only in accordance with such conditions and regulations for the protection of the public safety, and of the electric lines of the Postmaster-General, and of other telegraphic lines lawfully placed in any position, as may be prescribed in the notice. From the information received in reply to a circular addressed by the Board of Trade to the various Urban Sanitary Authorities in the United Kingdom, it appears that a considerable number of such lines exist throughout the country; and the Board prepared a model form of regulations which would be applicable to all such lines. These regulations were referred to the Council of the Institution of Electrical Engineers, by whom they were most carefully considered, and from whom the Board received valuable assistance. The Board are still in communication with the Post Office as to the provisions which should be inserted for the protection of telegraphic wires.

In the Provisional Orders and Licences now issued, provision is made that energy shall be supplied only by means of some system approved of by the Board, and subject to such regulations and conditions for securing the safety of the public, and for insuring a proper and sufficient supply of energy as they may impose. A copy of the regulations which have been issued under the Electric Lighting Act, 1882, and the Liverpool Electric Lighting Licence, 1888, is appended to the report.

The following is the special report above referred to, in which the Board explain their reasons for dispensing with the consent of the local authorities in certain cases:—

St. James, Westminster.—This parish, in which the St. James and Pall Mall Electric Lighting Company are already supplying under a Licence granted in 1888, was, with many other parishes and districts, included in the area applied for by (1) the London Electric Supply Corporation, (2) the Metropolitan Electric Supply Company. The former proceeded by Provisional Order and the latter by a Bill. The Vestry, in December, 1888, resolved not to oppose the Order of the London Electric Supply Corporation, subject to the Draft Order being first submitted to, and approved by them. Major Marindin was directed to hold an inquiry into the various applications for power to supply electricity in the Metropolis; and the Vestry were represented thereat. They supported the application of the Metropolitan Electric Supply Company, and opposed that of the London Electric Supply Corporation; but stated that inasmuch as the latter were already supplying a number of consumers in the parish, they would not object to concurrent powers being granted to them on the same terms as the other companies. In dealing with the applications, the Board of Trade were compelled to regard the interests of the Metropolis as a whole; and they endeavoured, in respect of the applications of the two Companies above mentioned, to make a fair distribution between them of the parishes and districts included by both in their areas of supply. In carrying out this distribution, the following points had to be considered:—(1) That the London Electric Supply Corporation were supplying largely in the parishes of St. James and St. Marylebone by means of overhead wires, without statutory powers; (2) That binding agreements had been entered into between the local authorities of the Strand district and St. Marylebone and the Metropolitan Electric Supply Company, which made it expedient to allot these districts to this Company. Deeming that it was most desirable, in the interests of the public, that the supply by means of overhead wires should cease, and being unable to disregard the fact that the London Electric Supply Corporation had established a business both in St. James and St. Marylebone, the Board decided to include the former parish in the area of the London Electric Supply Corporation, and the parish of St. Marylebone in that of the Metropolitan Electric Supply Company. As to the determining the distribution of the districts applied for, the Board of Trade had due regard to their situation, to the authorized capital of the two Companies concerned, and to the amount of existing competition in the areas assigned to each.

St. Margaret and St. John the Evangelist, Westminster.—Applications for power to supply electrical energy within this parish were received from (amongst others) the London Electric Supply Corporation, Limited, the Westminster Electric Supply Corporation, Limited, and the Kensington and Knightsbridge Electric Lighting Company, Limited; the last Company having already power to supply a residential portion of the district under Licences. The Vestry lodged objections to the various applications, on the ground, amongst others, that they desired at present to retain in their own hands the power of supplying electric light within their district. At the inquiry above referred to, the Vestry represented that they wished to await the issue of the proceedings before coming to any definite conclusion as to their course of action. The Board have divided the principal portion of the parish between the London and the Westminster Corporations, and assigned the detached portion of St. Margaret's to the Kensington and Knightsbridge Company. Since the issue of the Orders the Vestry have informed the Board that they have resolved to reserve the consideration of the question until the Bills relating to the Provisional Orders have been introduced into Parliament.

Board of Works for the St. Saviour's District.—The Local Authority for this district at first gave a conditional consent to the application of the London Electric Supply Corporation, which, however, they withdrew during the course of the inquiry, as they had consented to an application for a Licence by another company. Although the formal consent of the local authority has not been given, their representatives have attended at the Board, and arranged certain details of the Order, and the Board do not anticipate that they have any objection to the inclusion of their district in the Order.

Lambeth.—This parish was included in the applications of the London Electric Supply Corporation, Limited, and the Metropolitan Electric Supply Company, Limited. The Vestry lodged a formal objection to both the applications, and were represented at the inquiry. The Board have included a small portion of the parish north of Westminster Bridge Road in the Order of the London Corporation, and have included the whole of the parish in the Order of the Metropolitan Company. Although the formal consent of the Vestry has not been obtained, the Board trust the Orders as framed will remove the objections urged by that body.

Wandsworth District Board of Works.—The application of the Metropolitan Electric Supply Company, Limited, for their South London Order, included a portion of the district of this Board—viz., the parishes of Streatham and Clapham. The representative of the local authority stated at the inquiry that his Board did not appear as objectors to the preamble of the Order, but were most anxious to stimulate companies to come into their district. They desired, however, that the Order should be amended in various particulars, and that certain additional provisions should be inserted in it. The Board carefully considered these objections in framing the Order; and they inserted provisions to provide for the majority of the points raised by the local authority. At the invitation

* The proceedings on this inquiry were fully reported in the last volume of the Journal.

of the Board, the several representatives of the local authority attended at the offices of the Board to settle certain details of the Order; and, although the Board were unable to give effect to the wishes of the local authority in every particular, they trust the Order as issued will be satisfactory to that body.

NOTES FROM SCOTLAND.

(FROM OUR EDINBURGH CORRESPONDENT.)

EDINBURGH, *Saturday*.

At the meeting of the Arbroath Gas Corporation last Wednesday, Mr Cargill, the Convener of the Finance Committee, reported that the estimated revenue from gas and meter rents for the past year was £8623, but that the actual amount received had been £8640. From the sale of tar it was estimated that £350 would be derived; but this had been exceeded by £12 11s. The total revenue amounted to £8934. On the other side of the account, the actual amount spent for coal and lime was £3835, against an estimate of £3800. The result of the year's working was an apparent credit balance of £17 16s. The estimates for the current year, Mr. Cargill said, were as follows:—From gas and meters, £8033; and from tar, £840; making, with some minor items, £9157. On the other side they provided for expending £3935 15s., or £100 more than last year, on coals, lime, and other materials; £255 on the retort account; £150 on pipes and meters; and £1300 on wages. After meeting other items of outlay, they would, he reckoned, close the year with a credit balance of £75. He moved that the report be adopted, and that the price of gas be reduced from 4s. 2d. to 3s. 10½d. per 1000 cubic feet. Mr. Dickson, in seconding the motion, stated that the price of gas had fallen by nearly 2s. per 1000 cubic feet since the Corporation took over the works—it having been 5s. then. Mr. Carlow's report showed that the quantity of coals used during the year was 4293 tons 15 cwt., as against 4278 tons 10 cwt. in 1887-8; being an increase of 15 tons 5 cwt. The make of gas was 43,703,300 cubic feet, as against 44,135,400 feet the previous year—a decrease of 432,100 cubic feet. The gas made and sold per ton of coal carbonized was 10,178 cubic feet—a decrease of 138 cubic feet per ton, or 1·338 per cent.; and the gas sold was 9322 cubic feet per ton. The unaccounted-for gas for the year 1887-8 was 9·515 per cent. of the quantity made; this year it was 8·412—a decrease of 1·103 per cent. Mr. Carlow explained that there was not a decrease in the consumption; it was in the manufacture, and that if he had obtained the regenerative furnaces and new purifiers which he had asked for, he would have been able to submit a better report. The reports were adopted.

The gas undertaking of the Forfar Corporation seems to be in a position which cannot be called flourishing. Possibly this is but a reflex of the general condition of the town; but whatever be the cause, it is to be regretted. A special meeting of the Corporation was held last Monday, at which it was stated that during the past year the quantity of gas manufactured was 513,000 cubic feet—a decrease upon the previous year of 44,000 cubic feet. Residuals having risen from 3s. 7d. to 7s. per 100 gallons, there is a surplus on the accounts of £100, which it is proposed to apply in the reduction of the price of gas.

The Montrose Gas Company met last Wednesday, when it was reported that there was a profit for the year of £1228, as compared with £1242 for the previous year. During the year 25,041,700 cubic feet of gas were manufactured; being 2400 cubic feet less than the previous year. Last year the illuminating power was equal to 27·48 candles, as against 27·41 in 1888. There were carbonized 2299 tons of coals; being 10 tons less than in the previous year. The percentage of unaccounted-for gas was 7·50, a reduction of 0·75 as compared with 1888. The usual dividend of 3 per cent. was declared; and the report was adopted.

The Portobello Gas Company on Wednesday declared a dividend of 10 per cent. for the year ending May 31 last. The consent of the shareholders having been obtained to the proposal, it was finally resolved to register the Company now under the Companies' Acts as a limited liability Company. This movement is taken in connection with an increase of capital and extension of the works.

The Dundee Water Committee has for five years taken a prominent, perhaps the leading part, in the agitation for the reform of the method of rating water-works. That there is need for something being done is apparent when it is pointed out that the value of the Dundee Water-Works is: Underground, £309,879; and above ground, £270,706. Of that sum only £81,000 is within the city; and although the Committee pays £3100 of rates, only £600 falls to Dundee—the rest going to parishes whose only claim is that the pipe passes through them. The Committee met on Tuesday, and discussed what steps they should take to effect their contemplated reform by means of the Local Government (Scotland) Bill. After a good deal of talk, they decided, by ten votes to eight, rather to leave the matter to the representatives of the city in Parliament than to send a deputation of their own number to London.

(FROM OUR GLASGOW CORRESPONDENT.)

GLASGOW, *Saturday*.

At a meeting of the Finance Committee of the Glasgow Gas Trust last Wednesday, it was agreed to recommend to the Corporation Gas Commissioners that the price of gas be reduced to the extent of 2d. per 1000 cubic feet. This recommendation, after being approved of by the Gas Committee, will come before the Town Council at the next meeting of that body. If the recommendation is approved of, the price of gas in Glasgow and suburbs for the year 1889-90 will be 2s. 6d. per 1000 cubic feet; and that will also be the price at which the Partick, Hillhead, and Maryhill Gas Company will require to sell their gas. The price just mentioned is the lowest which has ever yet been known in Scotland; and it should be noted in connection with this fact that no meter-rent is charged either by the Glasgow Gas Commissioners or by the Partick Company.

The annual meeting of the Irvine Gaslight Company was held last week when a very favourable financial statement was submitted for the year ending the 18th inst. Including the amount carried forward at the last annual meeting, there was a total revenue of £3427; and the balance available for dividend was £953. It was stated that the reserve fund amounted to £2000, to which there fell to be added the sum of £477, which had been invested in the purchase of property; so that the total under that head was £2477. It was agreed to declare a dividend of 10 per cent., and to continue the price of gas at 3s. 9d. per 1000 cubic feet, the rate which has been charged for the past three years.

At a special general meeting of the Stewarton Gaslight Company, on Monday, it was unanimously agreed to increase the capital stock of the Company to the extent of £1600, to be composed of 200 shares at £8 per share, and that in the meantime £6 per share of the new stock be called up, payable on or before Nov. 1 next.

At the annual meeting of the Lockerbie Gas Company, held on Wednesday, a dividend of 8 per cent. on the results of the past year's transactions was declared; and the Directors reported favourably as to the condition of the works, the increasing consumption of gas, and the improving revenue from the sale of residual products.

The annual meeting of the Leven Gas Company was held at Alexandria (Dumbartonshire) on Thursday night, when a dividend of 8 per cent. was declared; and the price of gas was reduced from 4s. 9½d. to 4s. 7d. per 1000 cubic feet.

At the monthly meeting of the Greenock Gas Trust last Tuesday, the minutes presented by the Gas Committee contained statements of the revenue and expenditure for the year ending June 30 last, and they were approved. They showed that the income was £36,752; and the expenditure, £34,407—leaving a surplus of £2345. The profit in the preceding year was £3000; and in 1886-7, £2500. Some further particulars of the undertaking (which is under the management of Mr. S. Stewart) are reserved till next week.

At the monthly meeting of the Gourock Police Commissioners last Tuesday, it was reported that the price of gas had last year been reduced, which took about £70 off the income; but notwithstanding that fact they had this year a net surplus of £136. The income had been £2149; and the expenditure had amounted to £2013.

The death has just been announced of Mr. W. M. Neilson, well known from the long and prominent connection which he had in this city with the locomotive engineering industry. He died at Florence in the 70th year of his age. He was the son of Mr. J. B. Neilson (who died in 1865), the inventor of the hot blast applied to iron smelting, and specially interesting to persons connected with the gas industry from the fact that he was the first Manager of the Glasgow Gaslight Company. Indeed, it was while he was engaged in the service of that Company, as their Engineer, that he devised and worked out his famous invention. The deceased is said to have been worth £600,000 at his death, a large portion of which came through his father.

On Tuesday of this week business was done on the Glasgow Stock Exchange in the shares of the Partick, Hillhead, and Maryhill Gas Company at £5 6s. per share; and on Thursday there were transactions at £5 2s. 6d. up to £5 4s. per share.

It has just been stated in one of the Glasgow evening papers that in consequence of the action taken by the London County Council in the way of enforcing the provisions of the Metropolis Gas Act, in regard to illuminating power, it has been found necessary to resort to a more liberal use of such rich cannels as are worked in Lanarkshire and one or two other counties comprised in the Scotch coal-field. Some excellent contracts for cannel, it is said, have been placed in Scotland by one of the London Gas Companies. Collectively they amount to not much short of 100,000 tons.

The Glasgow pig-iron market opened very firm after the holidays last Tuesday; and the price of Scotch warrants advanced from 43s. 10d. on that day to 44s. 10d. on Thursday morning. In the afternoon, however, there was a reaction, and yesterday morning 44s. 4½d. was accepted; but in the afternoon there was a complete recovery—the closing price being 44s. 9d. cash buyers per ton. Scotch special brands have been in active demand during the week; and the rise in the price of warrants has had the effect of bringing out numerous orders during the week from local consumers. The requirements from the Continent have also been large.

Owing to the Glasgow holidays, which affect to a large extent the coal mining districts, business in the coal trade has been somewhat unsettled during the week. In general, however, the demand remains firm; and prices are well maintained.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 20.

Sulphate of Ammonia.—It is difficult to reconcile the state of the various markets, unless their tendency is ascribed to speculative movements. The east coast ports of Hull and Leith have been conspicuous by their dulness, while the reverse may be said of the London and Liverpool markets. At the former the demand during the greater part of the week has been so slow that concessions were freely made, and £11 15s. was accepted in many instances. Quite contrary to this, the London producers, importuned by some needy buyers, have raised their price; and Beckton sulphate is to-day quoted at £12 2s. 6d., and a similar price has been obtained at Liverpool for best makes for shipment to Spain, &c. Naturally it may be expected that this anomaly will rectify itself presently; and, Scotland excepted, there is no prospect of stocks accumulating. A better tendency generally has set in since yesterday; and to-day the Hull and Leith quotations are not less than £11 17s. 6d. The foreign orders are still to a great extent taken by speculators below current prices. Nitrate has become very flat again; and there is a decline generally of 3d. per cwt.

LONDON, *July* 20.

Tar Products.—There has been an unaccountable langour in this market. Buyers of benzol and anthracene are all waiting for lower prices. There appears to be a determined effort to screw down the price of benzols. It is stated that the larger quantity now being made by carbonizers is causing a decided over-production of this article. At present prices, it would pay gas companies very well to use it for carburetting purposes. A little taken out of the market in this direction would have a wholesome effect upon its value, which would be reflected in the value of tar. Pitch is firm; and it is now dawning upon the fuel makers that if they are to get their supplies for the ensuing season, they must pay the higher price quoted. Prices may be taken as follows:—Tar, 23s. to 26s. per ton, according to position. Benzol, 90 per cent., 2s. 6d. per gallon; 50 per cent., 1s. 10½d. per gallon. Toluol, 1s. 4d. per gallon. Solvent naphtha, 1s. 3d. per gallon. Crude naphtha (30 per cent.), 11½d. per gallon. Light oil, 3½d. per gallon. Creosote, 2½d. per gallon. Pitch, 21s. to 23s. per ton. Carbolic acid (60's), 3s. 9d. per gallon. Cresylic acid, 10d. per gallon. Tar salts, 15s. to £1 per ton. Anthracene (30 per cent.), "A" quality, 1s. 2d. per unit; "B" quality, 1s. per unit.

Ammonia Products.—Very little business is reported in sulphate, and prices continue about the same as they were a week ago. It is reported the Scotch producers are selling largely forward at a low price. Prices: Gas liquor (5° Twaddel), 7s. 9d. per ton, with a rise or fall of 1s. 6d. per degree. Liquor ammonia, 1½d. per lb. Sulphate of ammonia, £11 15s. to £12 per ton, according to position. Carbonate of ammonia, 3d. to 3½d. per lb. Muriate of ammonia, brown, £18 10s. per ton; white, £23. Balammoniac, £30 to £32 per ton.

WATER-WORKS FOR HAVANA.—A project is on foot for providing the city of Havana with water-works. The scheme is reckoned to cost about £400,000.

BOSTON (LINCS.) GAS COMPANY.—The accounts presented at the half-yearly meeting of this Company last Thursday, showed a balance sufficient to permit of the maximum dividends being declared. There was a profit on the revenue account of £3672. An annuity of £100 was voted to Mr. W. Stout, the late Manager of the works, on his retirement after 35 years' service. It was decided to reduce the price of gas from 3s. 6d. to 3s. 4d. per 1000 cubic feet.

SOUTHAMPTON WATER SUPPLY.—An inquiry was held last Thursday at Southampton, by Major-General C. Phipps Carey, R.E., on behalf of the Local Government Board, into an application by the Corporation to borrow £11,953, of which sum £2500 is required for the purpose of covering in one of the reservoirs on the Common, and £700 for the renewal of water-mains. The balance is needed for general town improvements.

THE CARDIFF CORPORATION AND THE CONTRACTOR FOR THE NEW RESERVOIR.—The dispute which the Cardiff Corporation had with the Contractor for the Taff Vawr reservoir (Mr. W. Jones) was supposed to have reached the stage of settlement, and law proceedings to have been avoided, when agreement for payment of £10,000 had been arrived at; but a Mr. T. Williams, of Neath, has given notice that he was a partner with Mr. Jones in the contract, and challenges the right of that gentleman to enter into any agreement without his consent. The Town Clerk therefore caused an interpleader summons to be issued; and the Master intimated that, failing an arrangement between Jones and Williams being arrived at before the 12th inst., he should direct that the £10,000, which it had been agreed to pay Mr. Jones, should be paid into Court.

GAS AFFAIRS AT LEEDS.—At the meeting of the Gas Committee of the Leeds Corporation held last Thursday, it was decided to raise the wages of the inspectors of gas-meters from 28s. per week to 30s. A report showed that whereas in 1882 there were 68,837 public and private gas-meters, there were now 80,080—an increase of 11,243. Three years ago the work of delivering gas and water accounts was also placed upon the inspectors, of whom there are 36. The question of the amount of gas consumed in public and private lamps was also considered. The lamps, it was stated, are supposed to burn about 3½ feet of gas per hour; but the actual quantity consumed has been at the rate of from 6 to 20½ feet. The Committee have instituted a thorough overhauling of all the lamps, with the view of effecting a saving. More than half the lamps have already been examined.

NORTHERN COAL TRADE.—There has been a brisker demand for coal during the past few days; and the collieries have been kept more fully employed. Steam coal is in fair demand, though there are some of the large contracts which are now being rapidly exhausted. The price is still on the basis of 9s. 6d. per ton, free on board in the Tyne, for best Northumbrian qualities. Small coal is rather scarce, and commands 4s. per ton. For gas coal, the inquiry becomes larger now, and some of the gas companies show a desire to stock coal early, as later on in the season a greater pressure is sure to be experienced. Although the labour question in the Durham collieries looks at the moment unpromising, it is expected that there will be a peaceful settlement of the difficulty. The price of best gas coal is about 8s. per ton, free on board in the Tyne; but it is no secret that much coal has yet to be supplied on contracts based on about 1s. 6d. or 2s. per ton less.

LITIGATION RESPECTING THE RATHMINES NEW WATER-WORKS.—The Court of Appeal of the High Court of Justice, Ireland, has been recently engaged, during several days, considering a case in which Sir Robert Herron, Mr. J. C. Colville, and Mr. F. W. Pim, mill and factory owners in the Kimmage and Harold's Cross districts, sought for an injunction to restrain the Rathmines and Rathgar Improvement Commissioners from continuing two reservoirs, and also to restrain them from diverting streams or water-courses in the state in which the streams now are, and in any other state than should be in accordance with the Rathmines Water Act, 1880. The defendants denied that they had done the acts complained of, and said the works had been constructed in accordance with the Act. In giving judgment, the Master of the Rolls declared that the works, in his opinion, were not constructed in accordance with the Act; and the plaintiffs were entitled to an injunction. He should, however, direct no injunction to issue until further order, so as to enable the defendants to take such steps as they might be advised; and the injunction should not issue pending an appeal or an application for an Act of Parliament. The defendants would pay the costs.

THE WATER SUPPLY OF BANGOR.—A demonstration took place at Bangor last Saturday week to celebrate the completion of the new intake which is to supply the city with water. Erected in the centre of one of the principal streets was a small spray fountain, surrounded by a miniature rockery, in which was placed a number of ferns gathered in the neighbourhood of the new intake. The Mayor (Mr. Alderman Pierce) having inaugurated the completion of the works by turning a handle which brought the jets into play, Colonel the Hon. W. E. Sackville West, Chairman of the Gas and Water Committee, addressed the spectators. He remarked that the works, which were most important for the interests of Bangor, had been brought to a successful issue. Nearly seven years ago the ratepayers and others entrusted with the government of the city were impressed with the necessity of seeking a water supply higher up the mountains than the existing intake. There had been some delay in carrying out the works; but through the energy and perseverance of Mr. Gill, the City Engineer, the difficulties had been overcome, and Bangor was now in possession of a supply of water equalled by few and surpassed by no town in the United Kingdom. Mr. Gill having described the works, the Mayor said the source from which the water was obtained was the largest springs that flowed out of the steep rocks of the mountains; and the quantity was so great that there was no danger of Bangor suffering, as other towns had done, from the inconvenience and danger of a water famine.

HEYWOOD CORPORATION WATER SUPPLY.—In his annual report submitted at a recent meeting of the Water Committee of the Heywood Corporation, the Engineer (Mr. J. Diggle) says that the total expenditure upon the Clay Lane new reservoir and Nayden middle reservoir works, including all plant, materials, and tools, has been: On the former, £43,371; and on the latter, £7254—making a total of £50,625. The payments on capital account during the year ended March 25 last amount to £13,803; making a total expenditure to that date of £238,910. The number of consumers inside the borough is 5764; and outside, 5881. The net receipts for water were only £5 more than in the previous year; but the receipts for that year were £830 in excess of those for the year ended March 25, 1887. The total receipts for water, fittings, &c., amounted to £15,892. The total payments on revenue account were: Annuities, £8119; interest, £3677; rates and taxes, £1325; working expenses, £1718; purchase of water, £100—making a total of 16,513; and leaving a deficiency for the year of £621. Although the above result is not so favourable as could be desired, the deficiency is £734 less than in the previous year, notwithstanding that £685 has been set apart from revenue for the redemption of loans and annuities in excess of the preceding year. It must, however, be remembered, observes Mr. Diggle, that the additional interest chargeable against revenue during the current year, consequent on the completion of the new works at Clay Lane, will amount to £1804. He congratulates the Corporation upon the completion of the Nayden middle reservoir works. The additional storeage capacity thus obtained will be amply sufficient to meet the increasing requirements of the district for many years.

COLNE VALLEY WATER COMPANY.—The Directors of this Company have issued their report for the six months ending the 30th ult., with the statement of accounts, which will be presented at the half-yearly general meeting on the 1st prox. With regard to the capital account, the sum of £1900 (including the £1000 mentioned in the last report) has been raised by the issue of new ordinary shares, out of which £932 8s. 3d. was spent during the half year, mainly on extensions. As to the revenue account, the Directors regret that, although the income of the Company continues to increase satisfactorily, the expenses, owing to defects in the new engines, have been so heavy that the profit (£2782 13s. 4d.) on the six months' working is rather smaller than it was for the corresponding period of 1888; the latter having been £2823 11s. 11d. On the other hand, considerable progress is being made in the detection of waste, and the loss of water from this cause is being much reduced. The amount available for dividend, after payment of £1491 15s. 3d. interest on preference shares and debenture stock, and transferring another £100 to the reserve account, is £1549 13s. 4d.; and the Directors recommend that out of this a dividend at the rate of 2½ per cent. per annum be again declared. This will leave £174 to carry forward, besides a reserve account of £664.

THE WOLVERHAMPTON CORPORATION AND THE PROPOSED NEW WATER-WORKS FOR BILSTON.—At the monthly meeting of the Bilston Township Commissioners last Thursday, a letter was read from the Wolverhampton Corporation with regard to the Commissioners' resolution authorizing an application to the Local Government Board for their sanction to a loan not exceeding £20,000 for the erection of water-works. Therein it was stated that the Corporation intended to apply at the earliest possible date for an injunction to restrain the Commissioners from proceeding with the water-works unless and until they gave the notice required by section 52 of the Public Health Act. By this section the Commissioners were restrained from committing a breach of their agreement with the Corporation for the supply of water. The Corporation is at present supplying Bilston by agreement with 220,000 gallons of water per day. It was decided to send a letter to the Corporation stating that the Commissioners intended to carry out the provisions of the agreement. They did not admit that they were under the obligation of giving notice under the Public Health Act; and they did not intend to give any notice themselves. They had already applied to the Local Government Board to sanction the loan. A resolution was also passed giving power to the Clerk to take all the measures necessary for opposing the Corporation's application.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For STOCK MARKET INTELLIGENCE, see *ante*, p. 161.)

Issue.	Share	When ex-Dividend	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	11 Apr.	10½	Alliance & Dublin 10 p. c.	10	18—19	..	5 10 6
100,000	10	,,	7½	Do. 7 p. c.	10	13—14	..	5 7 3
800,000	100	1 July	5	Australian (Sydney) 5% Deb.	100	109—111	..	4 10 1
100,000	20	30 May	10	Bahia, Limited	20	24—26	..	7 13 10
200,000	5	15 May	7½	Bombay, Limited	5	6¾—7¼	..	5 8 5
40,000	5	,,	7½	Do. New	4	5—5½	..	5 9 1
380,000	Stck.	14 Feb.	11½	Brentford Consolidated	100	229—234	..	5 0 5
125,000			8	Do. New	100	167—172	..	5 9
220,000	20	14 Mar.	10½	Brighton & Hove, Original	20	43—45	..	4 13 4
320,000	20	28 Mar.	11½	British	20	45—47	..	4 15 9
50,000	10	14 Mar.	11	Bromley, Ordinary 10 p. c.	10	20—22	..	5 0 0
39,000	10	,,	8	Do. 7 p. c.	10	13½—14½	..	5 10 4
328,750	10	30 May	10	Buenos Ayres (New) Limited	10	15—16	..	6 5 1
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	105—108	..	5 11 1
150,000	20	28 Feb.	8	Cagliari, Limited	20	25—27	..	5 18 6
550,000	Stck.	11 Apr.	13½	Commercial, Old Stock	100	267—272	+2	5 1 1
180,000	,,	,,	10½	Do. New do.	100	x18—218	..	4 18 8
180,000	,,	28 June	4½	Do. 4½ p. c. Deb. do.	100	122—125	..	3 12 0
557,320	20	14 June	13	Continental Union, Limited	20	46—48	..	5 8 4
242,680	20	,,	13	Do. New '69 & '72	14	32½—33½	..	5 8 5
200,000	20	,,	10	Do. 7 p. c. Pref.	20	37—39	..	5 2 6
75,000	Stck.	28 Mar.	10	Crystal Palace District	100	204—208	..	4 16 2
234,060	10	30 Jan.	13	European, Limited	10	25½—26½	..	4 18 1
120,000	10	,,	13	Do. New.	5	7½ 17½—18½	..	5 5 3
854,060	10	,,	13	Do. do.	5	12½—13½	..	4 16 3
5,468,600	Stck.	14 Feb.	13½	Gaslight & Coke, A, Ordinary	100	265—269	+2	5 2 4
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	100—105	..	3 16 3
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	257—262	..	3 16 4
80,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	123—128	..	3 18 1
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	182—187	..	4 0 4
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	100	167—171	..	4 1 10
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	355—360	..	3 16 11
1,061,150	,,	14 June	4	Do. 4 p. c. Deb. Stk.	100	118—121	..	3 6 1
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	126—130	..	3 9 3
650,000	,,	,,	6	Do. 6 p. c. do.	100	171—175	..	3 8 6
3,600,000	Stck.	15 May	10	Imperial Continental	100	206—309	−1	4 15 8
75,000	5	14 June	6	Malta & Mediterranean, Ltd	5	5—5½	..	5 9 1
560,000	100	1 Apr.	5	Met. of Melbourne, 5 p.c. Deb.	100	113—115	..	4 6 11
541,920	20	14 June	6	Monte Video, Limited	20	20—21	+½	5 14 3
150,000	5	30 May	10	Oriental, Limited	5	9—9½	..	5 5 3
60,000	5	28 Mar.	7	Ottoman, Limited	5	6½—6¾	..	5 3 8
166,870	10	16 Jan.	4	Pará, Limited	10	5—5½	−½	7 5 5
				People's Gas of Chicago—				
420,000	100	2 May	6	1st Mtg. Bds.	100	103—107	..	5 12 1
500,000	100	1 June	6	2nd Do.	100	99—102	..	5 17 8
100,000	10	26 Apr.	10	San Paulo, Limited	10	16½—17½	..	5 14 4
500,000	Stck.	28 Feb.	16½	South Metropolitan, A Stock	100	320—325	+3	5 0 0
1,350,000	,,	,,	12½	Do. B do.	100	243—248	+3½	4 17 9
141,500	,,	,,	13½	Do. C do.	100	260—270	..	4 18 1
600,000	,,	28 June	5	Do. 5 p. c. Deb. Stk.	100	137—142	..	3 10 5
60,000	5	28 Feb.	11½	Tottenham & Edm'ntn, Orig.	5	11—13	..	4 8 5
				WATER COMPANIES.				
717,467	Stck.	14 June	9½	Chelsea, Ordinary	100	267—272	+2	3 9 10
1,720,560	Stck.	11 Apr.	7½	East London, Ordinary	100	207—211	..	3 11 1
544,440	,,	28 June	4½	Do. 4½ p. c. Deb. Stk.	100	140—143	..	3 2 11
700,000	50	14 June	9	Grand Junction	50	124—129	+1	3 9 9
708,000	Stck.	14 Feb.	10½	Kent	100	275—279	+2½	3 15 3
1,043,800	100	28 June	9	Lambeth, 10 p. c. max.	100	253—258	..	3 9 9
406,200	100	,,	7½	Do. 7½ p. c. max.	100	200—208	..	3 13 10
200,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	120—123	+1	3 5 0
500,000	100	14 Feb.	12½	New River, New Shares	100	355—360	..	3 7 4
1,000,000	Stck.	30 Jan.	4	Do. 4 p. c. Deb. Stk.	100	127—133	..	3 1 6
902,300	Stck.	28 June	6	S'thwk & V'xhall, 10 p.c. max.	100	174—178	..	3 7 5
1,126,500	100	,,	6	Do. 7½ p. c. do.	100	164—169	..	3 11 0
155,066	Stck.	14 June	10	West Middlesex	100	265—270	+3	3 14 1

Next dividend will be at this rate.

GWYNNE & CO., ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C.

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS & ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 2698.

Exhausters of nearly all sizes in Stock.

Prize Medals at all the Great International Exhibitions.

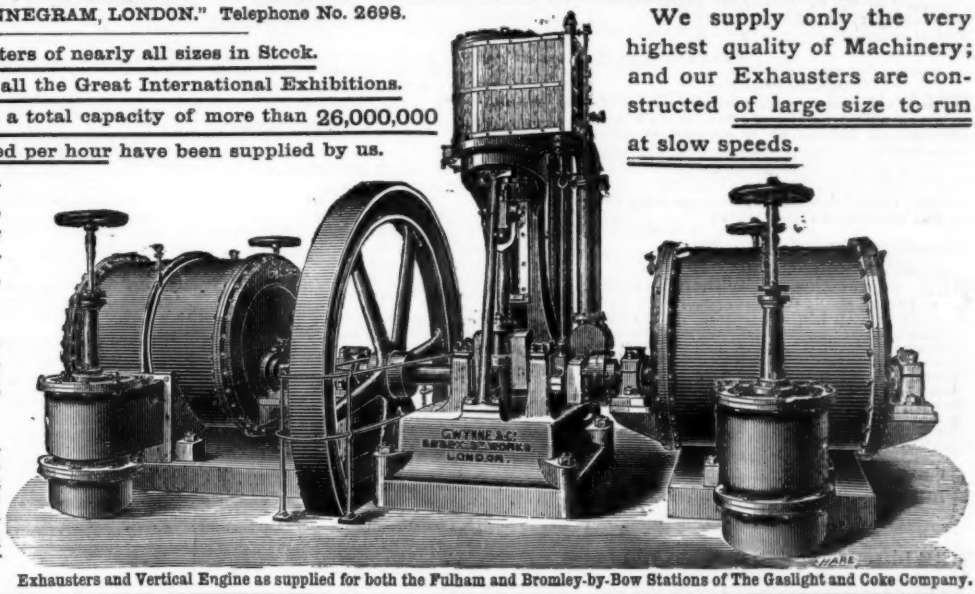
Exhausters equal to a total capacity of more than 26,000,000 cubic feet passed per hour have been supplied by us.

Our new Patent Non-Fluctuating Exhausters, to work without the slightest oscillation or variation in pressure, are strongly recommended.

MAKERS OF EVERY DESCRIPTION OF HYDRAULIC AND GAS MACHINERY.

Gwynne & Co.'s New Catalogue and List of Testimonials can now be obtained on application.

We supply only the very highest quality of Machinery; and our Exhausters are constructed of large size to run at slow speeds.



Exhausters and Vertical Engine as supplied for both the Fulham and Bromley-by-Bow Stations of The Gaslight and Coke Company.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.

Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

ANDREW STEPHENSON, Agent for the GAS PURIFICATION AND CHEMICAL COMPANY, Limited, Palmerston Buildings, Old Broad Street, LONDON, E.C.

CANNEL COAL, &c.

JOHN ROMANS & SON, EDINBURGH. Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.

Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, No. 54, BERNARD STREET, LEITH, } SCOTLAND.

SULPHURIC ACID, B.O.V., for Sulphate of Ammonia Making. Guaranteed clear, of full strength, and to produce a fine white-coloured salt, Delivered in carboys or railway tank waggons.

For prices and terms address BALE, BAKER, AND Co., 120 & 121, Newgate Street LONDON.

£20 will be given as a Bonus, by a Young Man (19 years old), to any Manager of small Works finding him a Situation as ASSISTANT.

Advertiser will consider all communications as strictly private and confidential.

Address No. 1728, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO CORPORATIONS AND LIMITED WATER COMPANIES.

THE Manager and Secretary of a Water- Works desires RE-ENGAGEMENT. Has life-long experience, and is thoroughly qualified to take full charge of any Water-Works, both indoor and outdoor work; experience in both large Corporations and Limited Company. Prepared to give the highest references, both as to qualifications and character, and most satisfactory reasons for desiring re-engagement. Security to any amount.

Address No. 1716, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a good Foreman Gasholder Erector.

Apply to SAML. WHILE, 60, Queen Victoria Street, LONDON, E.C.

WANTED, a Gas-Meter Repairer. One with a knowledge of Water-Meters preferred.

Address (stating Wages required) T. DUXBURY, Gas-Works, DARWEN.

WANTED, immediately, a Working FOREMAN for small Gas-Works, carbonizing about 400 tons of COAL yearly.

Applicants must state Age and Wages required (good House, Garden, Coals, and Gas found), and send in their references not later than the 30th inst. to the SECRETARY, Gas-Works, HOLBEACH.

Holbeach, July 16, 1889.

NEWTOWNARDS TOWN COMMISSIONERS.

WANTED, a second-hand Station GOVERNOR, with 5 to 7 inch Connections.

Full particulars to ALEX. WADDELL, Manager.

WANTED, a Gas Exhauster in good condition; capable of passing 1 million cubic feet of Gas per day.

Apply, with particulars and price, and stating where the Exhauster can be seen, to No. 1726, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TIMMIS & CO., of STOURBRIDGE Make only the best quality of FIRE-CLAY RETORTS, BRICKS, TILES, & LUMPS. Also SPECIAL SILICA BRICKS, to stand great heats. All descriptions kept in Stock.

For Prices apply to JAMES LAWRIE AND Co, 1, Whittington Avenue, Leadenhall Street, E.C., Sole Agents for London and District.

Telegraphic Address: "EIRWAL, LONDON."

W. C. HOLMES & Co., Huddersfield, AND 80, CANNON STREET, LONDON,

Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.

*** See Advertisement p. 187 of this week's issue.

Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.

First-Class Award, Melbourne Exhibition, 1889, for Wet and Dry Gas-Meters, Station Meters, and Governors, Pressure-Gauges, Street Lamps, and Pillars, &c.

Telegraphic Address: "Braddock, Oldham."

SHIPPING AND INSURANCE.

FOR Rates of Freight, &c., apply to ROBERT BRUCE FITZMAURICE, 9, Crosby Square, LONDON, E.C.

FOR SALE—A Set of Condensers, with 6-inch Bye-Pass, &c., complete. A TOWER SCRUBBER, 16 feet high, 3 feet diameter, with 6-inch Bye-Pass and Connections complete. In first-class condition.

Apply to Mr. TAYLOR, Hurst Mills Company, Limited, ASHTON-UNDER-LYNE.

GAS-WORKS AND CHEMICAL PLANT FOR SALE.

CARBONIZING Plant at Mount Vernon, Glasgow, FOR SALE, consisting of 60 Retorts, with Condensers, Exhausters, and Scrubbers; also Benzol Recovery Plant. All complete and in good order; having only been in use a short time. Makers, Dempster and Sons, Elland.

To be sold by private treaty, in one lot, or separately, to suit purchasers.

Apply to REID BROTHERS, 67, St. Enoch Square, GLASGOW.

TO TAR DISTILLERS AND OTHERS.

THE Gas Department of the Wigan Cor- poration invite TENDERS for TAR for One or Two years, commencing on the 1st of September, 1889, and terminating on the 31st of August, 1890 and 1891, respectively.

Particulars and forms of tender may be obtained on application to the undersigned.

The highest tender not necessarily accepted.

Tenders, sealed and endorsed "Tar," to be addressed and delivered to R. Darlington, Esq., Town Clerk, on or before the 20th of August next ensuing.

Jos. TIMMINS, Engineer, &c.

Borough Gas-Works, Wigan, July 17, 1889.

TENDERS FOR GAS COALS.

THE Directors of the Westerham Gas and Coke Company, Limited, invite TENDERS for a Year's supply of about 500 tons of the best screened GAS COALS, delivered at Westerham Station, in quantities to suit the convenience of the Directors.

Tenders, stating the description, and endorsed "Tender for Coals," to be sent to the Office of the Company on or before Wednesday, the 31st of July.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
CHARLES HOOKER,
Secretary and Manager.

Westerham, Kent.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application. Spent Oxide and Sulphate of Ammonia purchased.

120 and 121, NEWGATE STREET. LONDON, E.C.

TUBES.

FOR Gas, Steam, and Water; Galvanized, White Enamelled, and Hydraulic Tubes and Co.

JOHN SPENCER, Globe Tube Works, WEDNESBURY, and 14, Great St. Thomas Apostle, LONDON.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID for making SULPHATE OF AMMONIA of high quality and colour. *Delivery in Railway Tank-Wagons or Carboys.*

Highest References and all particulars supplied on application.

HUTCHINSON BROTHERS, Barnsley, Gas Engineers and Contractors, Makers of Gas-Meters and General Gas Apparatus, Sulphate of Ammonia Plant, Tools, and Sundries.

*** See large Advertisement in last week's issue, page 108.

JOHN RILEY & SONS, Chemical Manu facturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

HEALTH Exhibition, Worcester, in- cluding Sanitary Apparatus and Appliances, Arrangements for Water Supply, Heating and Cooking Apparatus, Electric Lighting, Smoke-Preventing Appliances, Articles relating to Personal Hygiene, Domestic Economy, Foods, Clothing, Life and Labour Saving Appliances, &c., to be held from Sept. 24 to Oct. 19, 1889, in connection with the Eleventh Autumn Congress of the Sanitary Institute.

Prize Medals and Certificates of Merit will be awarded for approved Exhibits.

Forms of application for Space, and all particulars, can be obtained from the CURATOR, Mr. E. L. BOX, 74a, Margaret Street, LONDON, W.

TENDERS FOR TAR WANTED.

THE Gas Committee of the Corporation of Blackpool are prepared to receive TENDERS for the surplus TAR produced at their Works during the next Twelve months, from Aug. 1.

Tenders, endorsed outside, addressed to the Chairman of the Gas Committee, must be sent in by Saturday, July 27.

By order,
JOHN CHEW, Gas Engineer.

Gas Office, Blackpool, July 18, 1889.

BOROUGH OF DEWSBURY.

THE Gas and Water Committee of the above Corporation invite TENDERS for the supply and delivery, during the Twelve months ending the 31st day of August, 1890, of

(1) Sulphuric Acid.
(2) Wet and Dry Gas-Meters.
(3) Cast-Iron Gas and Water Pipes.

Specifications and forms of tender may be obtained on application to the Gas Engineer, Mr. H. Townsend, Gas-Works, Savile Town, Dewsbury.

Tenders, under sealed covers, endorsed "Sulphuric Acid," "Meters," or "Cast-Iron Pipes" (as the case may be), to be sent to me not later than Saturday, the 3rd of August.

The lowest or any tender will not necessarily be accepted.

By order,
TREVOR C. EDWARDS,
Town Clerk.

Town Clerk's Office, Dewsbury.

SURPLUS TAR AND LIQUOR.

THE Gas Committee of the Penrith Local Board are prepared to receive TENDERS for the purchase of the surplus TAR and LIQUOR made at their Works up to the end of June, 1890.

Tenders, endorsed "Tender for Tar and Liquor," to be delivered to Mr. G. Wainwright, Public Offices, Penrith, not later than Saturday, July 27, 1889.

Further particulars may be obtained from the undersigned.

E. SHAUL, Manager.

TAR AND LIQUOR.

THE Eccleshill and Bolton Gas Company invite TENDERS for the surplus TAR and AMMONIACAL LIQUOR to be produced at their Works, together or separately, for Twelve months, from the 1st of September next. Can be delivered in Contractor's Tanks at the Station (G.N.R.).

Coal carbonized per annum, about 1800 tons.

Tenders, sealed and endorsed, must reach me not later than Thursday, the 1st of August.

J. MELLOR, Secretary.

Eccleshill, near Bradford, July 17, 1889.

CLITHEROE CORPORATION GAS-WORKS.

THE Corporation of Clitheroe invite TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR produced at their Gas-Works for One year from the 1st of September next.

Estimates of quantities and other particulars may be had on application to Mr. Miles, Manager, Gas-Works, Clitheroe.

Tenders are to be sent to the undersigned (at whose Offices conditions of contract can be obtained) not later than the 31st inst.

The Corporation do not bind themselves to accept the highest or any tender.

JOHN EASTHAM, Town Clerk.

Clitheroe, July 16, 1889.

HEMEL HEMPSTEAD WATER-WORKS.

TO BUILDERS AND OTHERS.

CONSTRUCTION OF RESERVOIR.

THE Directors of this Company will be pleased to receive TENDERS for constructing a RESERVOIR and other incidental Work in accordance with Plans and Specification for the same, which may be seen at the Office of the Engineer, Mr. A. F. Phillips, 31, Great George Street, Westminster, and at the Works, Hemel Hempstead.

Tenders to be delivered on or before the 2nd of August, addressed to the Chairman of the Water Company, Hemel Hempstead, Herts, and endorsed "Tender for Reservoir."

The Directors do not bind themselves to accept the lowest or any tender.

By order of the Board,
E. J. JONES, Secretary.

July 17, 1889.

LYTHAM GAS.

THE Commissioners of the Town of Lytham invite TENDERS as follows:—

1. For the supply and erection of a Wrought-Iron ANNULAR CONDENSER, with 12-inch Connections; a LIVESEY WASHER; and a LAYCOCK and CLAPHAM'S WASHER-SCRUBBER. Capacity, 300,000 cubic feet per day each.
2. For the supply and erection of about 180 feet of 12-inch Wrought-Iron FOUL MAINS, with Cast-Iron Irregulars and Valves.

Plans may be seen, and other particulars obtained, at the Office of Mr. Thomas Newbigging, C.E., 5, Norfolk Street, Manchester.

Tenders to reach the undersigned not later than Twelve o'clock Noon on the 25th inst.

The lowest or any tender not necessarily accepted.

CHAS. A. MYERS,
Clerk to the Commissioners.

Lytham, July 13, 1889.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Kingston-upon- Thames Gas Company are prepared to receive TENDERS for the purchase of the surplus TAR made at their Works, from the 24th day of July next, to the 30th day of June, 1890.

The probable quantity will be 180,000 gallons.

Full particulars may be obtained on application to Mr. Packham, Engineer, at the Works, Lower Ham Road.

Tenders to be sent in, addressed to the Chairman of the Directors, not later than Wednesday, July 24, 1889.

The Directors do not bind themselves to accept the highest or any tender.

By order,
J. A. FRICKER, Secretary.

July 12, 1889.

COUNTY BOROUGH OF SALFORD.

(GAS DEPARTMENT.)

SULPHURIC ACID.

THE Gas Committee invite Tenders for SULPHURIC ACID for Twelve months.

Quantity required about 1100 tons.

Forms of tender and all particulars may be obtained on application to the Engineer, Gas Offices, Bloom Street, Salford.

Sealed tenders, endorsed "Tender for Sulphuric Acid," addressed to the Chairman of the Gas Committee, must be delivered at the Town Clerk's Office, before Five p.m., on the 25th inst.

By order,
SAML. BROWN, Town Clerk.

Town Hall, Salford, July 22, 1889.

TO COAL OWNERS.

THE Directors of The Gaslight and Coke Company are prepared to receive TENDERS for a supply of COAL, for One, or Two, or Three years, from the 1st of July, 1890, in accordance with Specifications to be obtained at this Office.

The Company's annual consumption of Coal is about 1,750,000 tons; and the principal Works of the Company are accessible by Railway, in direct communication with all the Inland Coal-Fields, as well as by Screw Colliers from the Northern Coal Fields.

Tenders are to be sent in before Noon on Tuesday, the 13th of August next, addressed to me, and endorsed "Coal Tender."

By order,
JOHN ORWELL PHILLIPS,
Secretary and General Manager.

Chief Office: Horseferry Road,
Westminster, S.W., July 20, 1889.

MANCHESTER CORPORATION GAS-WORKS.

AMMONIACAL LIQUOR.

THE Gas Committee of the Corporation of Manchester are prepared to receive TENDERS for the Purchase and Removal of the AMMONIACAL LIQUOR to be produced at the Gaythorn, Rochdale Road, and Bradford Road Gas-Works during a period of Five or Seven Years, commencing at Noon on the 30th day of June, 1890.

The Committee do not bind themselves to accept the highest or any tender.

Sealed tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Ammoniacal Liquor," must be delivered at the Offices of the Gas Department, Town Hall, on or before Thursday, the 8th day of August prox.

Forms of tender and further particulars may be obtained on application, in writing only, to Mr. Charles Nickson, Superintendent of the Department. A deposit of One Guinea (which will be returned on receipt of the tender) must accompany each application for a tender form.

By order of the Gas Committee,
JOSEPH HERON, Town Clerk.

Town Hall, Manchester, July 5, 1889.

TO LIME MANUFACTURERS.

THE Corporation of Halifax are prepared to receive TENDERS for the supply of LIME required at their Gas-Works during the year ending the 30th of June, 1890.

Full particulars may be obtained on application to the Gas Engineer, Mr. T. Holgate, F.C.S, at the Gas-Works, Halifax.

Sealed tenders, endorsed "Lime," to be sent to the undersigned not later than Thursday, the 25th inst.

The lowest or any tender will not necessarily be accepted.

By order,
KEIGHLEY WALTON, Town Clerk.

Town Hall, Halifax, July 13, 1889.

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is hereby given that the Ordin- ARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Bridge House Hotel, London Bridge, in the Borough of Southwark, on Wednesday, the 14th day of August next, at Two o'clock in the Afternoon precisely, to receive the Directors' Report and the Accounts of the Company for the Half Year ended the 30th of June last, and to declare a Dividend for the same period.

The Transfer Books will be closed from the 31st day of July until after the Meeting.

By order,
FRANK BUSH, Secretary.

Offices: 709A, Old Kent Road, S.E.,
July 22, 1889.

Price 2s. per dozen, or 10s 6d. per 100, post free.

CONSPIRACY and Protection of Pro- perty Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

*** *The Act extends to Scotland and Ireland.*

This Day. Crown 8vo, 2s. 6d., cloth.

PUMPS AND PUMPING:

A Handbook for Pump Users; being Notes on Selection Construction, and Management.

By M. POWIS BALE, M. Inst. M. E., Author of "Woodworking Machinery," &c.

LONDON: CROSBY LOCKWOOD AND SON, 7, STATIONERS HALL COURT, E.C.

ROYAL CORNWALL POLYTECHNIC SOCIETY.

THE FIFTY-SEVENTH ANNUAL EXHIBITION WILL OPEN AT THE POLYTECHNIC HALL, FALMOUTH, ON TUESDAY, SEPTEMBER 10, 1889.

MEDALS AND PRIZES
Are offered in
MECHANICS, FINE ARTS, PHOTOGRAPHY, NATURAL HISTORY, AND OTHER DEPARTMENTS.

SPECIAL EXHIBITIONS OF DOMESTIC LIGHTING.

Board of Trade Certificate granted protecting unpatented Inventions.

For Prize Lists, Entry Forms, and all information apply to the Secretary,
EDWARD KITTO, F.R.M.S.,
The Observatory, Falmouth.

C. & W. WALKER.

GASHOLDERS; PURIFIERS; PURIFYING MACHINES;

CO_2 AND TAR-EXTRACTING WASHERS; SCRUBBERS;

SULPHATE & SULPHUR PLANT;

RETORT MOUTHPIECES; CONDENSERS;

LIFTING APPARATUS; CENTRE AND FOUR-WAY VALVES;

SLIDE VALVES; TAR BURNERS; &C., &C.

WOOD SIEVES.

ADDRESSES:

8, Finsbury Circus, London, E.C.; Midland Works, Donnington, Salop.

"FORTRESS LONDON." "FORTRESS DONNINGTON,"—Telegraphic.

To effect a great saving in

GAS-FURNACES use our Special Derbyshire **GANNISTER BRICKS.**

ADDRESS

JAMES WHITE & Co.,

ALBERT WORKS, WIDNES.

MARQUIS OF LOTHIAN'S

NEWBATTLE CANNEL.

QUOTATIONS ON APPLICATION TO

MR. JOHN MORISON,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

MIRFIELD, NORMANTON.

THE

"SILVER" LICHT.

CHANDLER'S PATENT.

SUITABLE FOR EVERY FORM OF LIGHTING.

A beautiful white light from ordinary Gas. Silent, steady, and economical.

PACKED IN BOX 9s., SUBJECT.

S. CHANDLER & SONS,

Central Works, Kennington Oval, S.E.

THE

LANEMARK COAL Co., LTD.,

Now offer their superior

GAS COALS

LANEMARK CANNEL.

Yield of Gas per ton . . 10,880 cub. ft.
Illuminating Power . . 29·21 candles.
Coke per ton . . . . 1266·96 lbs.

LANEMARK GAS COAL.

Yield of Gas per ton . . 11,379 cub. ft.
Illuminating Power . . 17·88 candles.
Coke per ton . . . . 1285·53 lbs.

LANEMARK GAS BRIQUETTES.

Yield of Gas per ton . . 10,784 cub. ft.
Illuminating Power . . 22·70 candles.
Coke per ton . . . . . 1320 lbs.

For Prices and Analyses, apply to

LANEMARK COAL Co., Ltd.,

NEW CUMNOCK, N.B.

TROTTER, HAINES, & CORBETT,

BRETTELLS' ESTATE

FIRE-CLAY & BRICK WORKS,

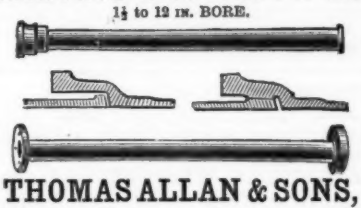
STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICK, Proprietors of BEST GLASSHOUSE POT & CRUCIBLE CLAYS.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

GAS AND WATER PIPES.

1¼ to 12 IN. BORE.



THOMAS ALLAN & SONS,

Bon Lea Foundry,

SOUTH STOCKTON-ON-TEES.

ALSO MANUFACTURERS OF

SANITARY & RAIN-WATER PIPES, HOT WATER PIPES, STABLE FITTINGS, RANGES, STOVES, And GENERAL CASTINGS.

GLASGOW OFFICE: 24, GEORGE SQUARE.

Telegrams:

"BONLEA, STOCKTON-ON-TEES."

"SPRINGBANK, GLASGOW."

THOMAS TURTON AND SONS, LIMITED,

SHEAF AND SPRING WORKS,

SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING-JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:

90, CANNON STREET, E.C.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 70 per cent.

For Prices and complete Analysis, apply to

YOUNG, DANCE, & CO.,

COAL OWNERS, NEWCASTLE-ON-TYNE,

Or E. FOSTER & CO., 21, John St., Adelphi, LONDON, W.C.

THOMAS ILLINGWORTH,

NORTH DEAN CHEMICAL WORKS,

Near HALIFAX,

MANUFACTURER OF SULPHURIC ACID

OF EXTRA QUALITY FOR MAKING

WHITE SULPHATE OF AMMONIA.

TAR, LIQUOR, AND SPENT OXIDE Purchased for Cash against Delivery.

THE ONLY RELIABLE

DRY CENTRE-VALVE.

WORKING ONE, TWO, THREE, OR FOUR PURIFIERS ON AT THE TIME.

ALSO MADE FOR TWO OR THREE PURIFIERS.

No Springing. No Leakage. No Foul Gas passed in Changing. Special Facility for Blowing the Air out of the Fresh Box before putting in Action, without driving it forward into the Holders.

Write for Prospectus.

ALSO DOUBLE-ACTION DOUBLE-FACED GAS & WATER VALVES.

F. WECK, 86, NEW STREET, BIRMINGHAM.

GAS COAL.

POPE & PEARSON, LTD.,

have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields in practical working over 10,000 cubic feet of gas, with an illuminating power of 16 candles; or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke.

This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

Jos. EVANS & SONS

WOLVERHAMPTON.

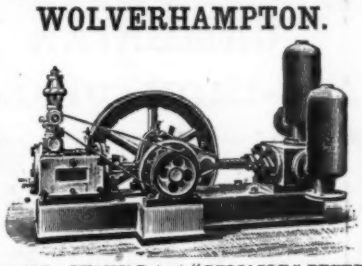


Fig. 685.—EVANS' Patent "RELIABLE" REVERSIBLE TAR and LIQUOR PUMP.

MELBOURNE EXHIBITION

1888-9.

THREE FIRST "ORDERS OF MERIT"

AND

A "SPECIAL MENTION"

AWARDED FOR EVANS' PUMPS.

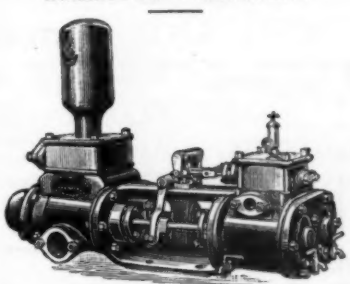


Fig. 670.—DUPLEX PUMP FOR GENERAL PURPOSES.

ROBERT MARSHALL,
CANNEL COAL MERCHANT,
97 WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on application.

COKE BREAKERS,
FROM £14 EACH.
(THOMAS & SOMERVILLE'S PATENT.)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

GEORGE WALLER & CO.,
PARK STREET, SOUTHWARK, S.E.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 21 & 22, WHARF ROAD,
CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1¼ to 48 Inches in diameter; and make and erect to order RETORTS, PURIFIERS, and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers and rendering leakage impossible.

CAST-IRON PIPES
FOR GAS AND WATER.
VALVES
FOR GAS, WATER, AND STEAM.

TELEGRAMS: "PIPES GLASGOW."
WM. MACLEOD & CO.,
56, ROBERTSON STREET, GLASGOW.

RUSCOE'S PATENT MACHINE
FOR DRILLING AND TAPPING WATER-MAINS AND GAS-MAINS UNDER PRESSURE.
Patent Saddle Back and Drilling Apparatus, whereby Gas and Water Mains can have 2-in., 3-in., 4-in., 5-in., and 6-in. Branches put on without loss of Water or Gas.
Sole Maker of HELPS' PATENT PIPE EXTRACTOR.
Prices and Particulars on Application to
JOHN RUSCOE, Albion Works, Hyde, near Manchester.

GAS COAL. BEST
REAL OLD SILKSTONE GAS COAL.
Address, THE STRAFFORD COLLIERIES COMPANY,
NEAR BARNSLEY, SOUTH YORKSHIRE.

THE WIGAN COAL & IRON CO., LIMTD.,
Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.
MIDLAND DISTRICT OFFICE: 22, TEMPLE STREET, BIRMINGHAM—AGENT: A. C. SCRIVENER.
TELEGRAPHIC ADDRESS: "WIGAN, BIRMINGHAM." TELEPHONE No. 200.

CAST-IRON PIPES, ETC.
THOMAS SPITTLE, LTD.
[ESTABLISHED OVER 50 YEARS.]
CAMBRIAN FOUNDRY, NEWPORT, MON.,
MAKERS OF
CAST-IRON PIPES FOR GAS, WATER, AND STEAM.
ALSO
Retorts, Mouthpieces, Lamp-Posts, Hydraulic Mains, H-Pipes, Dip-Pipes, Buckstaves, Ash-pans, Sight-Holes, Syphons, Ascension-Pipes, Fire Doors and Frames, Fire-Bars, Hydrants, Valves, Purifiers, Tanks, Columns, &c., &c.
ALSO ALL WROUGHT-IRON WORK.
THE LARGEST MAKERS IN WALES.

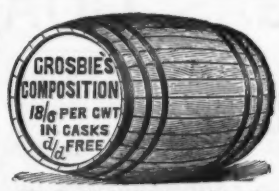
Messrs. Pease and Partners, Ld., Colliery Proprietors, Darlington, write: "Your Composition has given satisfaction wherever we have used it."

Sample Drums **20s.** per cwt. d/d.

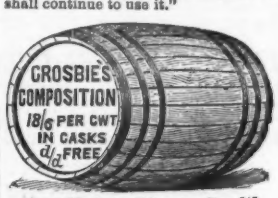
BOILER INCRUSTATION PREVENTED
IN OVER
1250 BOILERS
BY THE USE OF
Crosbie's Composition.

Scores of Testimonials can be had on application, and references can be given to Engineers, Colliery-Owners, Iron-Works, Cotton-Mills, Paper-Mills, Woollen-Mills, Brewers, Ship-Owners, Gas-Works, Glass-Works, Dyers, Printers, and, in fact, to Steam Users in almost **every Branch of Trade.**

"CROSBIE'S COMPOSITION" is testified by leading Analysts as **absolutely harmless to Metals,** and is certainly the most **economical** means of preventing Incrustation that it is possible to obtain.



The Pembroke Dock and Town Gas Company write: "Your Boiler Composition is giving satisfaction; and we shall continue to use it."



Also sold at **2s. 3d.** per gallon d/d.

ADOLPHE CROSBIE, Walsall Street Chemical-Works, WOLVERHAMPTON.

BRECKENRIDGE CANNEL,

OF KENTUCKY, U.S.A.

The undersigned, SOLE AGENTS for this celebrated Gas Cannel, now offer it for delivery at any port in

GREAT BRITAIN,

ON THE CONTINENT,

OR SOUTH AMERICA.

This Cannel ranks with the Australian Shale as an enricher of Coal Gas; One Gross Ton producing

15,000 Cubic Feet of 50-Candle Gas, & 26 Bushels of superior Marketable Coke.

FOR PRICES AND FURTHER PARTICULARS, APPLY TO

PERKINS & Co., SOLE AGENTS,

Cable Address: "Perkins New York." 228, PRODUCE EXCHANGE, NEW YORK

JOHN BROWN & CO., LIMITED,

ATLAS STEEL AND IRON WORKS, SHEFFIELD,

ALDWARKE MAIN GAS COAL.

This Coal yields 12,600 feet of 19-candle gas per ton.

Weight of illuminating matter in pounds of sperm, 820·80. Very free from impurities.

SPECIALITIES.

THE "NUGENT" RECUPERATIVE RETORT SETTINGS and FURNACES.

"ROBUS" IMPROVED RETORT SETTINGS, with COKE, TAR, and BREEZE FURNACES.

THE ABOVE SETTINGS & FURNACES ARE PROVING EMINENTLY SATISFACTORY.

Every Particular, with Estimates, forwarded upon Application to

MESSRS. J. & H. ROBUS,

CONTRACTORS FOR THE ERECTION OF GAS & WATER WORKS,

37, WALBROOK, LONDON, E.C.

ASHMORE, BENSON, PEASE, & CO., LTD., STOCKTON-ON-TEES.

TO GAS MANAGERS. SULPHATE OF AMMONIA PLANT.

CLIFF JOHN, & SONS, 7, WELLINGTON ST., LEEDS. FIRE-BRICKS & RETORTS.

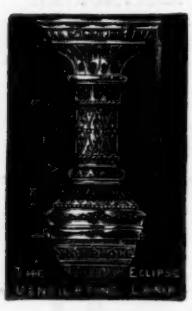
Telegrams—"FIRE-BRICK, LEEDS." Works: "CLIFF, POTTERIES, RUNCORN."

N.B. This Firm will quote on application their Discount Price of all Fire-Clay Goods. "Leeds" and "Yorkshire" qualities.

CHEMICAL STONEWARE "The best" for resisting Acids.

TAPS SEND FOR PRICE LIST.

"LIGHT, **Wenham Gas Lamps** MORE LIGHT."



ITS ADVANTAGES ARE:

IMMENSE ECONOMY IN THE CONSUMPTION OF GAS.

INTENSITY, PURITY, AND STEADINESS OF THE LIGHT.

Absence of Downward Shadow. Practical Completeness of Combustion.

CAN BE FITTED TO ORDINARY SUPPLY-PIPES WITHOUT ALTERATION.

CAN BE USED AS VENTILATING LIGHTS, whereby the products are removed, and damage to decorations, &c., prevented.

SOLE PROPRIETORS AND MANUFACTURERS: **THE WENHAM COMPANY, LIMITED.**

Birmingham Branch: 121, CORPORATION STREET. Works: UPPER OGLE ST., LONDON, W. Manchester Branch: 5, DEANSGATE.

R. DEMPSTER & SONS, Ltd.,

ESTABLISHED 1855.

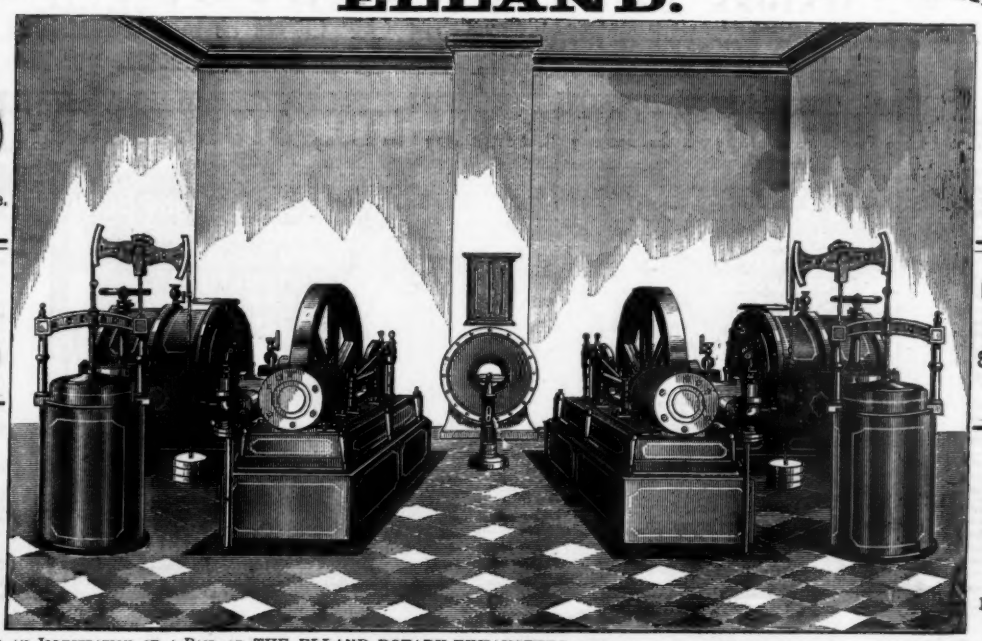
ROSE MOUNT GAS ENGINEERING WORKS, ELLAND.

No. 1. Flange Valve.

NO SLIP.

NO OSCILLATION

No. 3. Screw Valve.



No. 5. Screw Valve.

NO HIGH SPEED.

STEADY GAUGE.

No. 6. Disc Valve.

THE ABOVE IS AN ILLUSTRATION OF A PAIR OF THE ELLAND ROTARY EXHAUSTERS ERECTED BY US AT WIGAN, EACH OF WHICH ARE CAPABLE OF PASSING 80,000 CUBIC FEET OF GAS PER HOUR.

Makers of every other description of Gas Plant, including Retorts, Retort Mountings, Condensers, Washers, Tar and Liquor Separators, Scrubbers, Purifiers, Gasholders any size, Patent Centre-Valves, Four-Way Valves, Rack, Screw, and other Valves.

Testimonials and References on Application to

DEMPSTERS', ELLAND.

SAML. CUTLER & SONS, MILLWALL, LONDON,

CONTRACTING GAS ENGINEERS,

Manufacturers of GAS-WORKS APPARATUS of every description.

Livesey & Tanner's Patent TAR AND LIQUOR OVERFLOWS and TAR SCREEN for Hydraulic Mains.

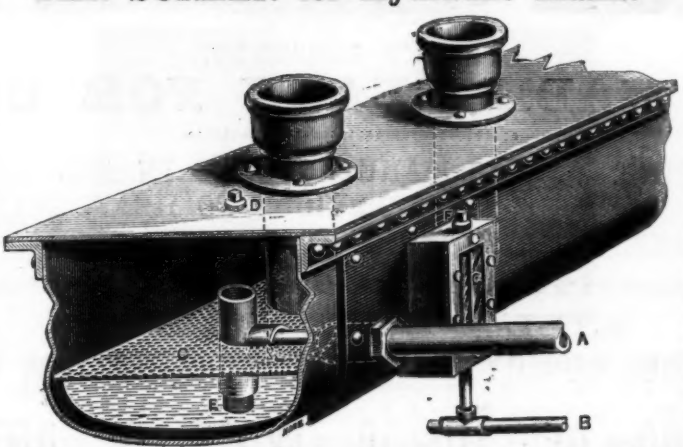
TESTIMONIAL.

Croydon Commercial Gas and Coke Company.
May 29, 1888.

Messrs. S. Cutler & Sons,

Gentlemen,—In answer to your letter of the 26th inst., I am pleased to be able to say that I am so satisfied with the LIVESEY AND TANNER TAR OVERFLOWS which I have had in use during the past winter, that I have recommended their adoption throughout our retort-houses

I am, yours faithfully,
J. W. Helps.



TESTIMONIAL.

Gas-Works, Tunbridge Wells,
Feb. 15, 1889.

Messrs. S. Cutler & Sons,

Gentlemen,—In reply to your inquiry respecting LIVESEY AND TANNER'S TAR AND LIQUOR OVERFLOWS, I have much pleasure in saying that they continue to give every satisfaction.

A few months ago I had a very striking proof of their value. I started four beds without the "Overflows," allowing the Tar to travel along with the Gas, when the illuminating power dropped a candle, and did not regain the loss until the "Overflows" had been put into operation. This experiment was repeated with the same result.

The apparatus requires but little attention; and if a small quantity of tar is run off regularly every morning, nothing further is required.—Yours faithfully,

Andrew Dougall, Jun.,
Assoc. M. Inst. C.E.

Index to Reference Letters in Illustration.

A, Tar-Pipe. B, Liquor-Pipe. C, Perforated Tar Screen, to prevent oscillation of liquor. D, Plug in top plate for access to nipple by special key. E, Nipple to adjust to within, say, ½ inch from bottom of main. F, Plug for access to nipple to adjust liquor level and for cleaning glass. G, Glass to see levels of tar and liquor in main.

MORRIS AND CUTLER'S PATENT "PERFECT" CONDENSER.
CUTLER'S PATENT SCRUBBER DISTRIBUTORS.
CUTLER'S PATENT WATER-VALVES FOR PURIFIERS.

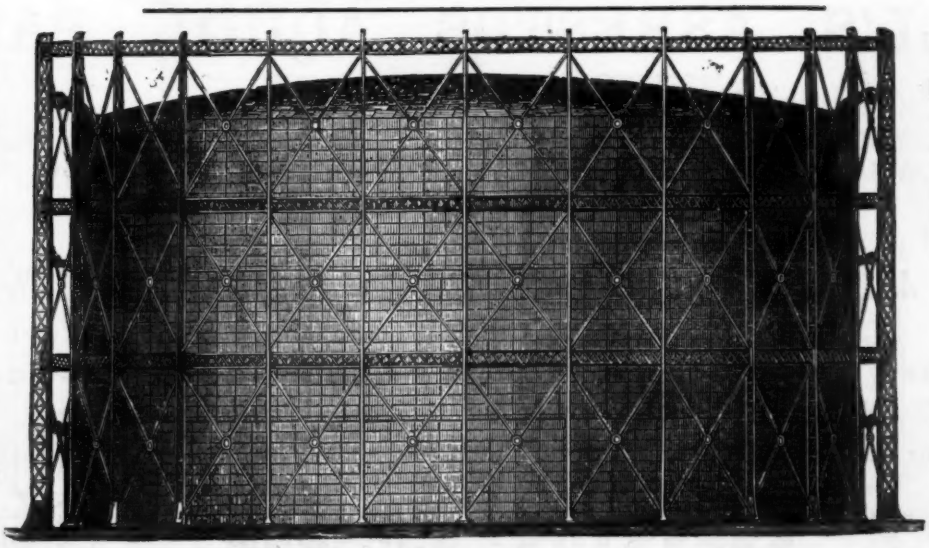
W. C. HOLMES & CO.,

ENGINEERS & CONTRACTORS FOR GAS-WORKS,

Whitestone Iron-Works, HUDDERSFIELD,

And 80, CANNON STREET, LONDON, E.C.

GASHOLDERS of Improved Construction.

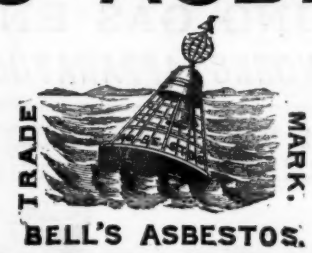


Tar, Sulphate, Muriate, and Liquid Ammonia Plants.

MAKERS OF

IMPROVED CONDENSERS, SCRUBBERS, AND WASHERS;
PURIFIERS with PLANED JOINTS; CENTRE-VALVES TO WORK ALL FOUR PURIFIERS; EXHAUSTERS;
AND ALL APPARATUS and FITTINGS used in GAS MANUFACTURE.

BELL'S ASBESTOS AQUOL PAINT



IS MADE READY FOR USE.

IS FIRE RESISTING.
IS WASHABLE.
IS NON-POISONOUS.
IS MANUFACTURED IN ALL USEFUL COLOURS.
IS IMPERVIOUS TO HEAT, COLD, OR WATER.
IS WITHOUT SMELL.

No expensive Oil or Turpentine required.

WILL NEVER BLISTER.

HAS A COVERING CAPACITY **40** PER CENT. GREATER THAN LEAD PAINTS.

For Outside or Inside Work in any Climate.

Bell's Asbestos Aquol Paint is equally suitable for the finest decorative work as well as for general painting. It can be applied over or under any other paint, and, owing to its easy application, can be used with a large distemper brush; the SAVING THUS EFFECTED IN LABOUR BEING **50** PER CENT. OVER THAT OF LEAD PAINTS.

Bell's Asbestos Aquol Paint is susceptible of the most delicate treatment; and, owing to its perfect flatted surface, it brings up the varnish in a manner that no other paint can equal. ONE COAT OF VARNISH ON **Bell's Asbestos Aquol** IS EQUAL TO TWO COATS ON ORDINARY PAINT.

BELL'S ASBESTOS AQUOL PAINT is specially adapted for Private Houses, Exhibition Buildings, Ships, Churches, Asylums, School Boards, Railway Stations, and all work of Wood, Iron, Cement, Plaster, Stone, Brick, &c., &c.

Those who Study Economy and Protection from Fire should use only

BELL'S ASBESTOS AQUOL PAINT.

BELL'S ASBESTOS AQUOL PRIMING is made Ready for Use.
BELL'S ASBESTOS AQUOL PRIMING stops all suction of Wood, Cement, Plaster, &c.
BELL'S ASBESTOS AQUOL PRIMING should be applied to all New Work.

Suitable for Ceilings, Walls, and New Wood, and is very durable.

BELL'S ASBESTOS AQUOL KNOTTING, for Stopping Knots in New Work.

AN EXCELLENT CURE FOR DAMP WALLS.

Colour Cards and Price Lists on Application.

Supplied in Casks of 5 to 7 cwt., and Iron Drums of 28, 56, and 112 lbs., Sample Tins of 7 and 14 lbs.

Owing to its Covering Capacity, a SAVING IN FREIGHT of 40 per cent. is effected for a given surface.

BELL'S ASBESTOS COMPANY, LIMITED,

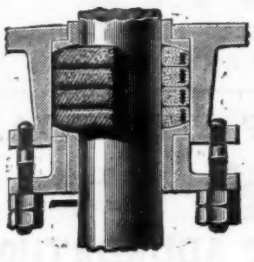
SOUTHWARK, LONDON, S.E.

DEPÔTS—MANCHESTER: Cable Street, Blackfriars. LIVERPOOL: 2, Strand Street, James Street.
CARDIFF: West Bute Street. BIRMINGHAM: 7, John Bright Street. HULL: Humber Dock Basin.
GLASGOW: 35, Robertson Street. DUBLIN: 2, St. Andrew Street. BERLIN and BARCELONA.

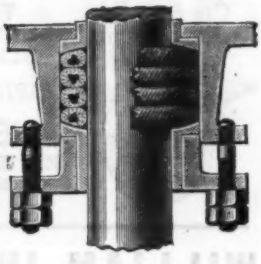
BELL'S ASBESTOS DAGGER

PACKING

PATENT No. 15,498.



ROUND.



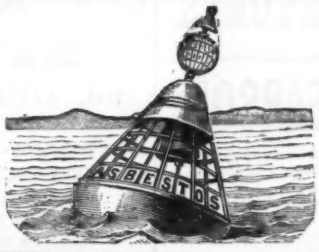
SQUARE. Every 10 feet has Label as above, and bears our Trade Mark.

Under this registered title are included the inventions of Mr. Field; and experience has proved them to be the MOST EFFICIENT DURABLE, and ECONOMICAL PACKINGS ever made. They constitute such a combination of Asbestos and India-rubber as secures the maximum of elasticity and heat resistance; and they are, therefore, UNEQUALLED FOR EVERY KIND OF ENGINE. These Packings are being universally used by most of the leading Steamship Companies throughout the world for ordinary Compound, Triple, and Quadruple Expansion Engines of the latest types. The packings are composed of rolled Asbestos Cloth, but the India-rubber is placed in two forms to suit various cases

IN ORDERING STATE WHETHER SQUARE OR ROUND IS REQUIRED.

BELL'S ASBESTOS CO., Ld.

DEPÔTS.
MANCHESTER: Cable St., Blackfriars.
LIVERPOOL: 2, Strand St., James St.
HULL: Humber Dock Basin.
DUBLIN, BERLIN.



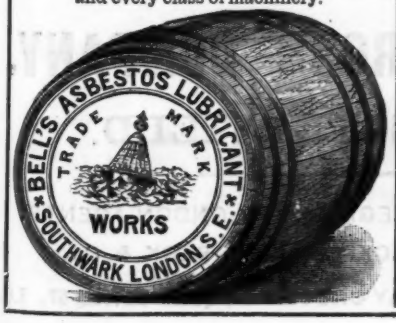
DEPÔTS.
BIRMINGHAM: 7, John Bright Street.
GLASGOW: 35, Robertson Street.
CARDIFF: West Bute Street.
And BARCELONA.

SOUTHWARK, LONDON, S.E.

BELLS ASBESTOS
YARN AND SOAPSTONE PACKING
Is the BEST LOCOMOTIVE PACKING made.

BELL'S
COMPOUND HYDRAULIC PACKING
Is specially suited for
Hydraulic Machinery, Accumulators, and Ammonia and all Pumps.

BELL'S ASBESTOS LUBRICANT
Is unequalled
For Steam-Engines & Cylinders, Gas-Engines, and every class of machinery.



BELL'S ASBESTOLINE
The reputation of this Lubricant is based on the experience of thousands of users, which places it far in advance of those who rely only on mere laboratory tests.

ASBESTOLINE IS THE CHEAPEST, MOST EFFICIENT, CLEANEST, MOST INODOROUS AND SAFEST LUBRICANT.

ASBESTOLINE HAS SAVED 60 PER CENT. OVER OIL.

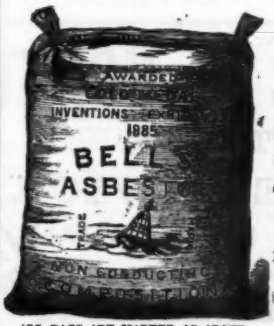
Has been used for all purposes, AND BEATEN ALL OTHER LUBRICANTS IN ACTUAL WORK.

BELL'S ASBESTOS
EXPANSION SHEETING
RINGS AND TAPE.

The above Sheeting, which can only be obtained from this House, is recognized as the most efficient and economical jointing material in use.

Is the most efficient and reliable material for Manhole, Mudhole, Steam-Pipe, and all other joints.

BELL'S ASBESTOS
NON-CONDUCTING COMPOSITION.



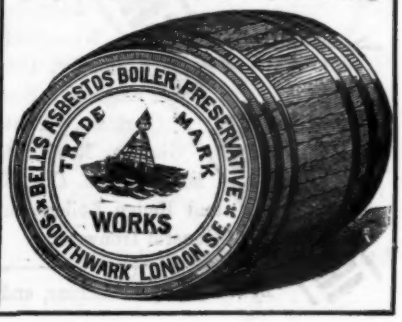
Will reduce loss by radiation, and saves 40 per cent. of fuel.

Is suitable for boilers with flat or round bottoms. Is superior to any other, and saves its cost in a few months.

Is sent out dry in bags; therefore cheaper than others sent out wet.

ALL BAGS ARE MARKED AS ABOVE.

BELL'S ASBESTOS
BOILER PRESERVATIVE
Will effectually keep Boilers clean, and remove any Incrustation, without injury to the Boiler, Plates, or Fittings.



"THE METEOR."

NEW HIGH-POWER GAS-LAMP,
WESTPHAL'S PATENT.
MOST INTENSE WHITE BRILLIANT GAS LIGHT.
MOST ECONOMICAL, SIMPLE, AND DURABLE.
DOES NOT GET OUT OF ORDER.
RIVALS THE ELECTRIC LIGHT.
NO ALTERATION REQUIRED TO EXISTING FITTINGS.
BURNER, BEING A CIRCULAR SLIT DOES NOT CHOKE UP.

PARTICULARS & PRICES POST FREE.

HENRY GREENE & SONS,
SOLE CONSIGNEES FOR GT. BRITAIN & COLONIES,
153 TO 155, CANNON STREET,
LONDON BRIDGE, E.C.

WILLIAM INGHAM & SONS,

WORTLEY FIRE-CLAY WORKS
Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing Adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT
MACHINE-MADE GAS-RETORTS.

WILSON CARTER & PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station, or for Export, all kinds of Fuel for Gas purposes.

ADDRESS CHIEF OFFICES:
Temple Buildings, 50, New Street, Birmingham.

J. & W. HORTON

ETNA WORKS,
SMETHWICK,
NEAR BIRMINGHAM
(Established 50 Years),

PATENTEES
AND
MANUFACTURERS
OF

IMPROVED GASHOLDERS AND BOILERS

and Manufacturers of every description of

Gas Apparatus,

Cast and Wrought Iron Tanks, Purifiers, Condensers, Scrubbers, Retort-Lids, Cross-Bars and Screws, Wrought-Iron Boilers for Stationary, Portable, and Marine Engines, Sugar Pans, Coolers, Clarifiers, Punts, Boats, Bridges, Girders, Roofs, Cisterns, Oil-Tanks, Melting-Pots, Crucibles, Salt-Pans, Arch and Range Boilers, and every description of General Ironwork.

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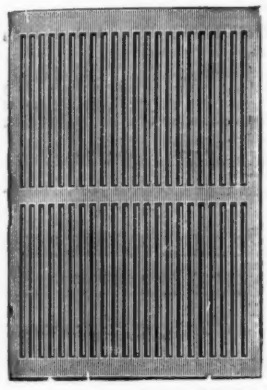

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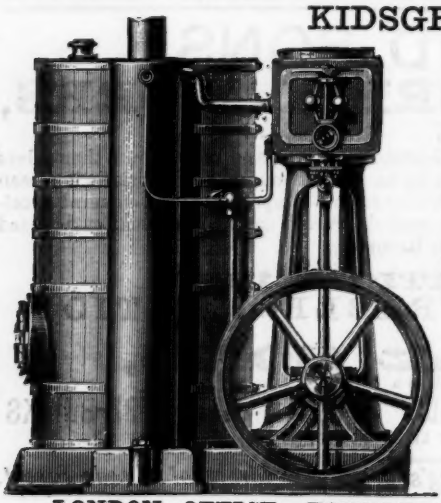

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London: Printed by WALTER KING (at the office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, July 23, 1889.